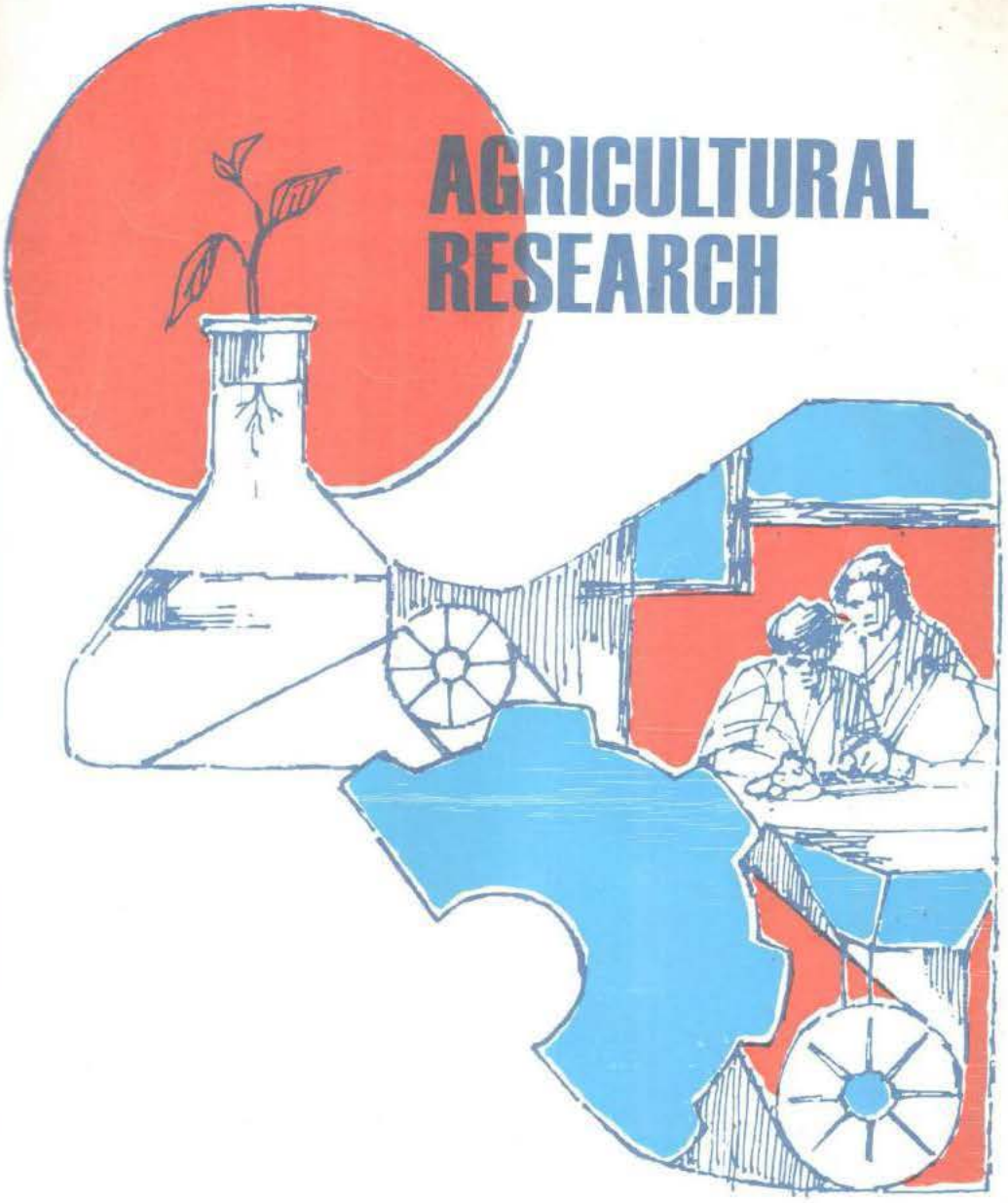
AGRICULTURAL RESEARCH



RESEARCH CUM DEMONSTRATION FARM

ARUNDHATINAGAR

DEPARTMENT OF AGRICULTURE

GOVERNMENT OF TRIPURA

सत्यमेव जयते

AGRICULTURAL RESEARCH

Department of Agriculture
Government of Tripura
Agartala.

CONTENTS

SALIENT FEATURES OF STATE AGRICULTURAL RESEARCH CENTRE

Arundhatinagar, Àgartala.

Research always contributes to the building of new ideas and concepts. All our day to day activities- either by machinery or even thinking are the results of query of mind, analysis and research work. Research significantly develops where there has been a question of basic need, particularly for Food. Agriculture is specially designed in relation to food production and as such research use to enrich the Agriculture every day. However in relation to Tripura where 80% of the population is directly or indirectly related to agriculture and allied activities for their livelihood, Agriculture research activities have a profound importance for the production of food. Moreover the food production and socio-economic status of people in general determine the growth of any state.

We know, at the time of joining independent India, in the year1949, the population of Tripura was only 6.30 lakhs. Two third of the total 10.50 thousand sq.km geographical area, constituted by undulated terrain where the forest and premitive cultivation i.e. jhuming were the only practice of crop resources. The Transformation of the advanced agricultural practices which has already been taken place in other states of the Country, did not have any reflection in this state. The situation of the state was changed altogether after partition of undivided India by rapid influx of refugees from East-Pakistan - now Bangladesh. Acute deficiency of food soon after this influx. Since then the State, has been compelled to start importing the food grains in an increasing order every year to meet the demand for food. Under the above scenario the state also stepped into advance agricultural practices to tackle the situation. From another angle, Tripura is the second smallest state in India with a dis-proportionately large population which is at present more than 32 lakhs. Moreover Tripura has got little opportunity to develop economically other than agricultural & related sector due to geographical position and other factors including problem of communication. As such agriculture continues to be the back bone of the economy of Tripura.

Considering all aspects the state Agricultural research station / R. C. D. F. was established at Arundhatinagar, in the year of 1961 with an area of 20.80/ hacs. At a very early stage, the centre started with 5 (five) Divisions Viz. plant breeding, Agronomy, Plant protection, Farm and Agricultural Information Division to cater to the demands of the farming community of the state. subsequently other divisions started functioning in the Centre.

Different research Institutes of India, including coordinated projects like D. R. R. I. of Hyderabad, CRRI of Cuttuck, Pulse Improvement Project of Kanpur, JARI of Barrackpur, West Bengal recognized this Research Center at Arundhatinagar to act as coordinated centre. Different collaborative research works have been conducted by this research Centre for last 30 Yrs. in collaboration with these Premier research Institutes of India. Besides, some new varities have also been evolved like AR-11,AR-25 , AR-26 etc. in this station. Due to different eco-system along with agro-climatic Zones, extensive multilocational trials are being conducted by the Agronomy Division of the station regularly since long back to standardise the best agro technique as well as fertilizer requirement of Crops befitting the ever changing situation, deficiency in major elements as well as micronutrients level of soil, creates a major problem to reach the productivity of sensitive HYV. up to the desired level.

However it may not be irrelevant to mention here that Tripura is one of the most important God gifted states in India, where almost all the short duration Crops can be grown successfully due to the touch of all different agrometeorogical – Six Ritues and as such extensive multilocational trials are required to be conducted in a regular basis.

Agro-climatologically the state is endowed with hot-humid climate making it suitable for the cultivation of Tropical and Sub-Tropical Crops. From amongst the net agricultural area only 29% (approx) falls under low land or lunga land, where more than 2/3 of the area comprises of up and tilla land. As rice is the stapple food crops of the state it has shown an increasing trend in productivity level but probably it has been limited to low-land areas only whereas the up-land yields have changed a little since the up-land along accounts from major portion of Agricultural land the proper strategy for

upland cultivation can make the state self sufficient in food grains. Low-land yields are almost 3 folds or more compared to upland and further increasing in low-land shall be highly input intensive, but suitable emphasis on upland agriculture can help in increasing food production in the state. The pulses, potato and oil seeds, have recorded a significantly increasing trend in the state but due to rainfed condition under which these crops are grown make them prone to wide range of Production fluctuation. Therefore for making agricultural yield predictable and stable, it is pertinent at this juncture to renovate the vital components of the agricultural system.

Since majority of the H.Y.V. are input intensive and our upland system is altogether a low input technology namely very low to nil fertilizer application, exclusive dependance on rainfall etc. made even the high yielding varieties unsuitable for upland eco-system. As such identification and development of improved varieties for upland conditions have to be taken up on a priority basis.

Wide range of cultivation of short duration autumn Crops/Varieties shall make the system renumerative Viz, Black gram, Ground nut, Toria could be concentrated more as additional crops in the upland areas. However Agronomy division of the center has been conducting extensive research work both in high and low land areas, for a long time back.

The plant protection chapter, is another field of immense importance. After the sowing till the harvesting of Crop, the crop is always under the moon of environment. Due to the problem of pollution and other factors the new concept of "I. P. M." has also been introduced. Necessary trials are being conducted regularly to standardize the methodology to protect the Crop within the limit of ETL.

Bio-Control is an integral part of the IPM concept. Control of pest &diseases by other bio-agent is a tool of nature to maintain the balance in eco-system. Without interfering with the environment this is one of the safest methods to manage different pest and diseases. One Bio-control laboratory has established in the year-2000 and started working at Datta-Tilla, under state Agriculture Research Complex. Different Bio-Agents Viz. Pseudomonas fluorescence, Trichoderma viridae etc. were collected from the different

research Institutes of India, nurished-multiplied and already supplied to the cultivators field after necessary training and demonstration. These bio-agents are successfully working in the cultivators fields to control some of the important pest and diseases. The result is very much encouraging.

Bio-fertilizer is one of the best inputs / agents under the integrated nutrient management for better crop protection. Besides supply of plant nutrients silenly the agents rejuvinate the soil health altogether. Considering the global demand for organic farming and organic cultivation this bio-fertilizer occupies special place of dignity. The Bio-fertilizer laboratory of the center has been producing different strains of Bio-fertilizer agents namely Rhizobium, Azotobactor, Azospirillum, Bio-Phos (and earned revenue to the extent of Rs. 355530/- (approx) during last 3(three) Yrs. To cater to the demands of the farming community 10 more laboratories have been proposed for active consideration.

One new Laboratory, the Pesticide Testing Laboratory is going to be established in the centre very soon to test / check the pesticides as well as efficacy of the pesticides supplied. The funds have already been received and the system is under process.

Soil and its components have a profound importance on growth, development and production of crops. In fact this is one of the main factors of any plant life.

The HYV is very much sensitive to adequate nutrients for any desirable production. The nutrien status of the soil can only be judged by the testing of Soil Sample as such testing of soil sample is pertinent for any successful production

The soil testing laboratory of the Research Centre has shouldered for years together to the testing of Soil Samples of the whole state. To cater to the cultivators demands another soil testing laboratory was also established in south Tripura District besides 4 mobile Testing laboratories working in 4 districts to test the soil in situ. Till date testing of static Soil Samples 4 districts namely of West, Dhalai & North Tripura is being done by the soil testing Laboratory of the Centre.

SALIENT FEATURES

Among the 3 basic activities of Agricultural deptt. Namely Research, Education & Extension, the Agri. Information Division of the Centre has been working to transmit all the New ideas related to varieties, improved agricultural practices, plant protection etc. from door to door among the cultivators by means of Press, electronic media as well as different publications. Due to language problem, illiteracy and other factors the system of audio-visual method is also being used extensively besides organization / participation in different Mela in all the Agri. Sub- Division as well as in District &State level fairs. Apart from these activities regular training programme are also been conducted where cultivators get the opportunities to discuss and interact with the subject matter specialist directly. In other words the Agri. Information Division of the Centre shouldering total extension system of the Department.

One of the most important Division of the Agricultural research is the Plant Breeding Division. In fact plant breeder is the team leader for introducing any new varieties for cultivation right from the art of breeding to the selection for cultivation. The plant Breeding Division of the Centre is working with these objective and bred and recommended some of the good varieties for Tripura namely AR-11, (Upland) AR-25, AR-26(For Low Land) in recent past.

As per policy of the Govt. this Divition is extensively working to select H.Y.V. of the allied Crops including varieties suitable for upland eco-system and deepwater paddy also.

Some of the finest work of this Division are introduction of Hybrid Paddy in cultivators fields namely Viz. DRRH-1, KRH-2, PHB-71, Proagro-6201. Production of Hybrid Seeds in the Centre and evolving of New Hybrid Paddy Varieties namely ARH-1& ARH-2,Apart from these, this is the first time in North eastern Zone that Cultivators were trained to under take the production of Hybrid Seeds in their own field under the direct supervision of this Centre. These ventures will certainly help us to achieve our target - our promise of Self sufficiency in food-grains within 2010.

Thanking you.

PLANT BREEDING

ANNUAL REPORT

Plant Breeding Division of Research-cum- Demonstration Farm, Arundhutinagar under Department of Agriculture, Govt. of Tripura, engaged in doing the following research works during the year
2002-2003.

The area of research are :

1. Conduction of Rice Testing at National Level.

1.1. Rainfed upland trials.

1.2. Rainfed low-land trials.

1.3. Irrigated trials.

1.4. Slender grain variety trials.

2. Conduction of Front Line Demonstration Programme under ICAR-UNDP project on hybrid rice.

3. Conduction of State Composition Programme:-

3.1. Evaluation and maintenance of local germ plasm

3.2. Multilocational Varietal Trial in Boro.

3.3. Hybrid Rice Seed Production.

3.4. Maintenance/Production of different Parental lines.

3.5. Development of New Hybrid Culture.

3.6. Conduction of Adaptive trial on pulses.

4. Conduction of Land to Lab. Interaction.

TABLE SHOWING WEATHER PARAMETERS PREVAILED DURING THE CONDUCTION OF DIFFERENT TRIALS.

Month	Rainy days	Total Ranifall (mm)	Avg. max.Temp (°c)	Avg. min Temp (°c)	Avg. Sunshine (hr.)	Avg wind velocity (Km/hour)
April,02	09	87.6	31.3	21.1	9.9	5.9
May, 02	20	275.1	31.1	22.4	5.9	6.2
June,02	17	382.0	30.4	24.3	3.8	7.7
July, 02	25	736.0	29.7	23.8	2.3	6.9
Aug, 02	27	524.8	30.6	24.0	4.7	5.1
Sept.02	16	310.3	51.7	25.1	6.5	6.0
Oct. 02	10	114.4	30.5	22.0	6.2	1.5
Nov. 02	5	135.0	28.4	17.8	6.9	2.6
Dec. 02	0	0.0	33.5	14.3	6.8	2.0
Jan. 03	0.	0.0	22.7	9.9	5.6	2.5
Feb. 03	2	0.8	30.0	17.2	8.2	3.4
Mar, 03	10	130.9	30.1	17.7	6.7	4.1

**Data collected from ICAR Complex, Lembucherra, Tripura.

1.0. CO-ORDINATED RICE RESEARCH:

During 2002-2003 Plant Breeding Division of Research-cum-Demonstration Farm, Arundhutinagar, conducted 11(eleven) Nos. coordinated variety trial in the State. The aim of conducting those trials is to isolate suitable variety fit for different rice based eco-system of Tripura. A total of 207 entries including 66 nos. hybrids were evaluated in Tripura during 2002-2003. Out of which 9 Nos. of trials consisting of 183 genotypes and 2 Nos. of trials consisting 24 Nos of genotypes of Rice were tested in Kharif and Rabi respectively. The results are discussed eco- system wise for different trials conducted in Tripura.

1.1. RAINFED UPLAND TRIALS :-

Moisture stress due to erratic rainfall resulting in low productivity is the major constraint for rice grown in direct seeded rainfed upland condition. Considering the situation short duration draught tolerant variety are essential to fit into the rice based cropping system in Tripura. For this purpose 2 Nos.of experiments under the category-Advance Variety Trial-Very Early (AVT-VE) and Advance Variety Trial-2 Early(AVT-2E) were conducted at this station. The salient finding,trial -wise, are discussed as follows.

1.1.1. ADVANCE VARIETY TRIAL- VERY EARLY (AVT-VE) :-

The Trial was constituted with 20(twenty) entries involving 3(three) checks (Heera, Aditya and Vandana as local). The trial was conducted at Arundhutinagar under this particular situation. The experimental mean yield at this location was 1273 kg/ha. CV percentage and CD(.05) recorded 10.6 and 222 respectively.

The plant height (cm) of test entries ranges from 60 cm (IET 17518) to 106 cm (IET-17515). The flowering duration of the entries varied from 51 days (Heera, IET-17614) to 76 days (IET-17509 and IET-16936). The panicle/Sqm ranged from 131(IET-17512) to 250 (IET-16945). The performance of entries are as follows:

IET NO.	Designation	Days to 50 flowering	No.of panicle (Sqm)	Plant ht. (cm)	Grain Yield (Kg/Ha)	Grain Type
16933	AD95157	71	182	82	1440(5)	MS
16934	AD97230	68	215	89	1100	LS
16935	BTCE 23/99	71	178	72	1210	LS
16936	AAUDAR 9304-14-4	6	228	67	1380	LS
16945	OR1509-9-VE	66	250	65	2160(1)	LB
16946	OR2060-5	69	184	91	1024	LB
16815	RAU-1345-2	63	178	67	900	SS
17508	CNB 1253-1-29-22	70	182	64	1250	LB
17509	CNB 1259-5-21	76	185	74	1630(2)	SB

17512	PNR551-16-4-2	52	131	68	970	LB
17513	PNR 555-30-15	56	190	74	914	LB
17514	RR 267-7	51	156	85	1010	MS
17515	RR 345-2	59	163	106	1400	SB
17516	OR-2072-2	66	194	75	1600(3)	SB
17517	OR-2069-10	62	178	72	1320	LB
17518	OR-2009-1	63	160	60	1200	MS
17519	RP-2652-6796-770-1	64	169	79	1440(5)	MS
Heera	(NC)	51	136	66	1330	
Aditya	(RC)	66	181	72	1390	
Vandana(LC)	65	200	84	1470(4)		
Mean	64	182	76	1307		
CD(05)	-	-	-	-	222	
CV	-	-	-	-	10.60	
D/S	-	-	-	-	02/08	

IET 16945(OR1509-9-VE) developed from the cross OR 924-2-5/OR-1045-1-10 with grain yield of 2160 kg/ha ranked first. It flowers in 66 days & has long bold grain. It's yield performance is higher than the National, Regional and Local check by 62.4, 55.4% and 46.9% respectively. IET-16945 also ranked first in All India mean yield. This variety ranked third in yield performance during 2001 Kharif under AVT-VE Trial conducted at this station.

Considering its yield potential and yield stability during last two years in Tripura this culture can be recommended as a most promising culture for direct seeded upland condition. This has also been reported by the Directorate of Rice Research, Rajendranagar Hyderabad in their progress report for varietal improvement during 2002.

IET 17509(CNB 1259-5-21) ranked second with grain yield of 1630 kg/ha. It flowered in 76 days and possesses short bold grains. It shows superiority in yield performances over

Heera, Aditya & Local by 22.6, 17.3 and 10.9 respectively. No. of panicles/sqm and plant height(cm) recorded for this variety were 185 and 74 cm respectively.

Among the entries IET 17516(OR-2072-2) with grain yield 1600 kg/ha ranked third in the trial. Flowering duration, panicle/sqm and plant height(cm) recorded as 66, 194 and 75 respectively having short & bold grain type.

With grain yield of 1470 kg/ha, Vandana(Local Check) ranked 4th in position. It recorded 65 days flowering duration & 200 Nos. panicles/sqm having 84 cm of plant height.

5th ranks jointly occupied by IET 16933 & IET 17519 with grain yield of 1440 kg/ha. These varieties shows yield superiority over Heera and Aditya by 8.2% and 7.5% respectively.

1.1.2. ADVANCE VARIETY TRIAL- 2 EARLY, DIRECT SEEDED (AVT-2E):

The trial was constituted with 19 test entries (18 Inbreeds, 1 Hybrid) and 3 checks and evaluated under direct seeded rainfed condition. The experimental CV% at Arundhutinagar was 5.40 percent and the experimental mean of this trial was 1498 kg/ha. Performance of these entries of this trial are given below:-

IET NO	Designation	Days to 50% flowering	Panicle / sqm. (nos.)	Plant height (cm)	Grain yield (kg/ha)	Grain type
16818	NLR 5200-56	68	195	75	1166	SB
16820	RP3403-43934-2577	77	283	68	1378	MS
16822	RP3522-44598-2592	78	243	66	1501	MS
17030	AD 96012	74	283	66	1586	MS
17035	CNB 1253-2-5	77	240	76	1335	MS
17037	CNB 1253-4-15	72	272	83	1679(3)	MS
17040	NLR 33950	98	286	78	1191	MS
17041	NLR 33671	97	289	82	1134	SB
17042	UPR 2154-4-2	74	291	76	1470	MS
17043	UPRI 97-5	82	228	71	1367	LS
17045	JR 90-107-2	86	260	116	1310	LB
17048	OR 1777-1	78	302	67	1470	SB

17050	NDR 1100	71	236	91	1096	LS
17051	NDR 1087-10	74	327	74	1660	LS
17058	MRB-2	68	271	79	1890(2)	SB
17061	RP-2240-59-54-SS	70	200	70	1635	LB
17063	RP-2240-116-4-SS	83	194	76	1590	LB
17064	RP-2526-14767-1143-SS	76	222	68	1555	LS
17304	PAC80004(HYBRD)	73	306	66	2053(1)	LS
Annada	(NC)	73	173	71	1545	
Narendra-97	(RC)	67	205	65	1676(4)	
Rasi	(LC)	74	197	76	1673(5)	
Mean	-	77	250	75	1498	
CD(.05)	-	-	-	-	133	
CV%	-	-	-	-	5.4	
D/S	-	-	-	-	26/06	

It reveals from the table that days to 50% flowering ranges from 67(Narendra-97) to 98 (IET 17040). The panicle/sqm and plant height varies from 173(Annada) to 327(IET 17051) and 65 cm(Narendra-97) to 116 cm(IET 17045) respectively.. IET 17304(PAC-80004) ranked first in yield performance among the entries with 2053 kg/ha. This entry recorded second in rank with 2747 kg/ha in All India mean grain yield.

IET 17058 (MRB-2) derived from a cross IET 11691/IET 7191 with 68 days flowering duration and short bold grain ranked second in the trial (1890 kg/ha). It shows superiority over the National check, Regional check and local check by 22.3%, 12.8% and 13% respectively.

Third position with 1679 kg/ha grain yield occupied by IET 17037(CNB 1253-4-15). Days to 50% flowering, panicle per sqm and plant height in cm recorded in this entry were 72 days, 272 Nos. and 83 cm respectively. This entry exhibits its dominancy in yield performance over the National check by 8.70% and at par with the Regional check as well as local check. 4th and 5th ranks occupied by regional check(Narendra-97) and local check(Rasi) with grain yield of 1679/ha and 1673 kg/ha respectively.

1.2. RAINFED LOW LAND TRIAL :-

Due to high rainfall (more than 2500 mm per annum) exist in Tripura, 94%(approx) of total rice area falls under rainfed low land rice cultivation, locally termed as Aman Rice, where the scope of improving productivity by elevating the genetical potential exists. Occasional draught as well as submergence in low land condition also reported from these areas. The varietal technology must possess in its repertoire long duration, photoperiod sensitivity/ insensitivity , draught/submergence tolerance and resistance to major biotic stress. Out of Aman areas 55.38% area in Tripura falls under semi deep water situation having water depth varies from 30 to 100 cm. Keeping the view in mind semi depth water trial were designed with the help of DRR and conducted at Churaibari SMF under North Tripura in Kharif 2002.

1.2.1. ADVANCE VARIETY TRIAL-1- SEMI DEEP WATER (AVT-1 SDW):-

Advance varietal Trial-1 semi deep water (AVT-1-SDW) was constituted with 7 Nos. of test entries and 3 checks. Water depth was maintained 20-40 cm throughout the crop stage. The seeds were sown on 6th July, 2002 and transplantation was done on 26th July, 2002. the detailed observations recorded in this trial are tabulated below:-

IET NO	Designation	Days to 50% flowering	Panicle /sqm.	Plant height (cm)	Grain yield (kg/ha)	Grain type
16958	IR-53487-141-3-3-2-1	112	113	183	3475	LS
16913	NDRSB 9830121	105	115	133	2828	LB
17305	CR 1000-1	106	112	187	2024	LS
17309	CR 2004-1	125	120	195	3932(5)	MB
17318	OR1234-12-1	117	192	169	5982(1)	MB
17319	OR1559-36-1	118	214	152	5612(2)	MB
17320	OR 1893-1	118	123	135	4344(4)	MB
SABITA		(CHECK)	106	118	176	1463
PURNENDU(CHECK)		118	117	201	3148	
POOJA (LOCAL)		112	112	134	4477(3)	

MEAN	114	134	167	3729
CD(.05)		766		
CV(%)	12			
D/S	06/07			
D/P	26/07			

IET 17318(OR 1234-12-1) from Malaxmi /IR 62 with 117 days to 50% flowering ranked first (5982 kg/ha). This entry ranked second with 4277 kg/ha grain yield in All India mean. It is significantly superior to Sabita, Pumendu and Pooja by 308.9%, 90% and 33.6% respectively.

IET 17319 a derivative from a cross, OR 624-7/RP 2087-115-10, ranked second with grain yield of 5612 kg/ha having medium bold grain type. Flowering duration, panicle/sqm and the plant height recorded of this variety are 118 days. 214 Nos. and 152 cm respectively. It is superior to Sabita, Purnendu and Pooja in respect of yield performance by 283.6%, 78.3% and 25.30% respectively.

Third rank obtained by the local check (Pooja) with grain yield of 4477 kg/ha.

The forth and fifth rank occupied by IET 17320(4344 kg/ha) and IET 17309 took 125 days to 50% flowering which was the highest among the entries.

1.3. IRRIGATED TRIALS :-

The major production and productivity gains achieved so far is mainly from the assured irrigated areas. During 2001-2002, 59000 ha were available under assured irrigated ecosystem in Tripura, which is 39.59% of net Rice area (1.49 lakh ha). 27.25% of production was accounted in this ecosystem in Tripura against 63% of production is accounted in All India level during 2001-2002. With the explorative agriculture practice to maximize the Rice yield per unit area is a cause of concern, further enhancing the genetic yield potential is essential to cater to the future need. It is therefore necessary to continue efforts through conventional and heterosis breeding to develop suitable high yielding genotype with desirable quality and pest/disease resistance . Considering its bare needs a total of 7(seven) experiments were conducted as Mid Early (AVT-2 IME) Medium (AVT-2-IM), Hybrid (IHRT-E, IHRT-ME,IHRT-M) and Boro Trials (AVT-2-Boro, IVT-Boro). The performance of entries, trial wise are presented below in details.

1.3.1. ADVANCE VARIETY TRIAL-2- IRRIGATED MID EARLY (AVT- 2 IME):-

This trial was constituted with 10(ten) test entries alongwith 3(three) checks namely Sasyasree(National), IR-64(Regional) and Krishna Hamsa(Local). It was conducted at RCDF, Arundhutinagar during Kharif 2002. Details of the performances of entries are presented below:-

ET NO	Designation	Days to 50% flowering	Panicle /sqm.	Plant height (cm)	Grain yield (kg/ha)	Grain type
16708	KAU C3-2	90	284	118	2778	SS
17079	NDR 2062	95	279	120	4103	LB
16527	OR 2006-25	103	305	120	4360	LB
17243	EXPH 209	84	303	115	4746(3)	LS
17246	XR-593	91	247	117	4781(2)	LB
17247	PRH-III	96	285	134	5880(1)	LB
17248	PRH 122	99	313	126	4501(4)	LS
17249	DRRH-13	94	368	121	4500(5)	LS
17250	DRRH-14	86	288	108	3568	LB
17242	HRI-138	97	302	100	3378	LB
Saysree		(NC)	87	267	106	3766
IR-64	(RC)	83	247	112	3673	-
Krishna Hamsa	(LC)	81	243	94	3486	-
Mean		91	287	115	4117	-
CD(.05)			548			
CV%		7.9				
D/S		13/07				
D/P		14/08				

IET 17247(PRH-III) a hybrid from Hindustan Lever Ltd with long bold grain and 106 days flowering duration with a grain yield of 5880 kg/ha ranked first in this trial at RCDF,

IR-64(NC) 69.1	53.0	6.26	2.07	3.02	LS	VOC	5.33	300	4.5	24.62	65
PR-106(NC)71.1	66.0	6.54	2.08	3.14	LS	VOC	5.66	300	7.0	26.22	61

Mill: Milling(%) , HRR:- Head Rice Recovery(%), KL: Kernel Length(mm), KB: Kernel Breadth(mm), L/B ratio: Length Breadth Ratio, Grain chalk:- Grain Chalkiness : VER:- Volume Expansion Ratio, WU:- Water Uptake, ASV:- Alkali Spreading Value, AC:- Amylose Content(%), GC:- Gel Consistency (mm), A:- Absent, VOC:- Very Occasionally Present.

NOTE:- Post harvest Milling & Processing facilities for slender grains is very much essential for the State. State Govt. may think over for installation of semi Automatic Mini Rice Mill plant alongwith polisher at four District HQ instead of existing hullers.

2. FRONT LINE DEMONSTRATION UNDER I.C.A.R. - UNDP PRO JECT ON HYBRID RICE IN TRIPURA.

For diffusion of modern technology and also for population of hybrid rice cultivation in Tripura, Plant breeding division of R.C.D. Farm, Arundhutinagar under Directorate of Agriculture, Govt. of Tripura conducted 20 ha Front Line demonstration on hybrid rice in 4 Agri Subdivisions, 5 ha each, under ICAR-UNDP project during Boro 2002-2003. These demonstration exhibits the excellent performance of hybrid rice in relation to yield parameter during boro 2002-2003 all over the state of Tripura. The details of these demonstration are depicted below:-

Location	-	1. West	- Melagarh Agri Sub Div.
		2. South	- Bagafa Agri Sub- Div.
		3. North	-(a) Panisagar Agri Sub.Div.
			-(b) Kanchanpur Agri Sub. Div.
Unit area	-	12.5 acres (5 ha)	
Total area in state	-	50 acre (20 ha)	
Season	-	Boro 2002-2003	
Name of Hybrids	-	KRH-2	
Nos. of cultivators involved.	-	61 Nos.	
Date of sowing	-	14.1.2003 to 28.1.2003	

8886	112	-	110	122	115
16826	111	-	-	-	
9671(IR-64)	113	-	110	121	115
11005(NDR-359)	126	-	124	129	126
17613	111	-	99	123	111
17197	112	-	100	120	111
17611	113	-	97	121	110
17612	119	-	124	133	125
723(Jaya)	126	-	126	136	129
17194	113	-	99	125	112
Mean	114	-	107	123	115

IET 12888(KAU 8870) a derivatives from a cross Br-51/Culture 23332-2 with a mean grain yield of 6361 kg/ha rank first. It recorded 113 days flowering duration in the trial. This entry ranked first (7683 kg/ha) at Nalchar SMF and 2nd rank at Churaibari SMF(6708 kg/ha). In RCDF this culture ranked 4th with grain yield of 6825 kg/ha. It shows superiority in yield advantage over the widely adopted variety(Jaya) in Tripura during Boro by 30.5%. IET 12888 also ranked 2nd (7921 kg/ha) in mean grain yield during Boro 2001-2002 in multi location varietal trial.

On the basis of consistency in yield performance during 2001-2002 and 2002-2003 IET 12888 can be recommended as one of the most promising culture for Boro in Tripura.

IR-64(IET-9671) a derivatives from a cross IR-5657-33- 2-1/IR2061-465-1-5-5 ranked 2nd with mean grain yield of 6330 kg/ha with long slender grain. It exhibits yield superiority over the Jaya by 29.9%. It stood 1st (7000 kg/ha) at Churaibari and ranked 3rd at RCDF(6827 kg/ha) and also at Nalchar SMF(6983 kg/ha). The mean flowing duration recorded by IR-64 in the trial is 115 days. IR-64 ranked 1st (8198 kg/ha) in mean grain yield during Boro 2001-2003.

IR-64 also proved its superiority in yield performance in Tripura during Boro 2001-2002 and 2002-2003 in multi locational trial and also established its superiority in relation to yield performance in AVT-Boro and IVT-Boro during 2002-2003 at this

applied within 7 days after rice emergence (DARR) . Hand weeding twice was carried out at 20 and 40 DARE. the treatment details alongwith the per ha yield obtained from each Treatment is given herewith.

Treatment Details

Sl.No.	Treatment	Concentration	Dosage (kg ai/ha)	Grain Yield (Mt/ha)
1.	Anilophos	30 Ec	0.60	0.92
2.	Anilophos Followed by 24 NA	30 Ec	0.40	0.90
3.	Butachlor	50 Ec	1.50	1.38
4.	Butachlor Safener	50 Ec	1.00	0.90
5.	Butachlor followed by 24-D Na at 25-30DARE	50 Ec 80wp	1.00 0.600	1.15
6.	Pendimethalin	30 Ec	1.500	1.45
7.	Pendimethalin followed by 2,4 D Na at 25-30 DARE	30 Ec 80 wp	1.00 0.60	0.95
8.	Hand weeding Twice	20 And 40 DARE		1.00
9	Non Weeded Control		0.86	

Pendimethalin performed better than other weedicide including its conbination with 2,4-D Na as compared to ther weedicides in controlling weeds . the variety heera was utilized in their trial. The degree of rain water management and or the moisture conditions in general appeared to play more significant role in enhancing pamicle production , pamicle weight and ultimately the grain yields of rice , rather than efficacy or herbicides alone.

entries applied Nitrogen at graded levels increased the grain yield up to 100 kg N/ha beyond which yield reduction recorded was significant . The per cent reduction in grain yield at 200 kg N/ha over 100 kg N/ha was 17.2 Mean Nitrogen response at graded level of N application was 34.4 , 23.9 , 15.1 and 8.2 kg grain .kg N respectively with regard to panicle production and weight the trend is the same as the grain yield production reported.

The results of 1996 Kharif trials shows that graded levels of Nitrogen increased grain yield significantly up to 100 kg N/ha (5.04 t/ha) while there after differences between 100 kg N/ha and 150 kg N/ha (5.53t/ha) ; and 150 kg N/ha and 200 kg N/ha (5.69t/ha) were found to be non significant . The percentage increase in grain yield at 50, 100. 150, and 200 kg n/ha over control was 18.18, 23.83, 35.87 and 39.80 respectively . The N response at graded levels of N were 14.8 , 9.6 and 8.1 kg grain / kg N. Among the test varieties pro-Agro recorder maximum grain yield (6.01 t/ha) followed by DRRH -1 (5.92 t/ha) and CNHR-3 (5.68 t/ha) but the differences among all these hybrids were non-significant while check variety Rasi recorded significantly lower grain yield. The percentage increase in grain yield of DRRH-1, Pro-Agro and CNHR-3 over standard check Rasi was computed to 13.680,140.4 and 127.20 respectively variety DRRH-1 recorded maximum N response 27.8 kg grain /kg N followed by CNHR-3 (22.4 kg) and pro-Agro (15.6 kg) at the initial level of 50 kg N/ha.

Similar trend has also been found in the result of Kharif 1997 Trial . In clay loam soil of Arundhutinagar the grain yield difference between N levels , varieties and their interaction were significant . The maximum grain yield of 7.36 t/ha was obtained at 100 kg N/ha which found on par with next higher done (150 kgN/ha). the reduction in yield was significant beyond 150 kg N/ha . All the hybrids viz IAHB-4A, Pro-Agro 6201 recorded significant higher yield over local check variety Rasi . Among the interaction of Nitrogen and variety mean maximum grain yield recorded at 100 kg N/ha with pro-Agro-6201 (7.85 t/ha) followed by IAHB -4A (7.78t/ha) at same N level . The percent increase yield over local check with Hybrids pro-Agro-6201, IAHB-4A and DRRH-1 was 38.1, 34.6 and 33.6 respectively.

NITROGEN RESPONSE AND NUTRIENT USE EFFICIENCY OF HYBRID RICE VARIETIES DURING RABI

In a typical low land ecosystem of Tripura the experiment on nitrogen responses on hybrid rice during Boro was taken up to evaluate the appropaiate dose of 'N' Fertilizer . the hybrid varieties used is this trial was VRH-4 , GK-5006 pro-Agro-620 and Rasias local check . The levels of Nitrogen were 0, 50, 100 150, and 200 kg N/ha.

CD (0.05)	0.28
CV(%)	1.90
EXPTMEAN	8.46

QUALITY ASPECTS

Milling recovery percentage of PHB-71 is 74.5%, KHR-2 , 71.9 DRRH-1 71.5% and Head rice recovery is KHR-2 67.2% followed by PA-6201- 66.7% PHB-71 66% . The study reveals these charachters varies from location to location .

COOKING CHARACTENISTICS

The Cooking quality is directly depended on the value of three parametes namely , Gelatine factors temperatune (GT), Amylose content (AC) and gel consistency (GC)

The data of directorate of rice research , Hyderabad , on the basis of sample recieved from our trials showed that DRRH-1 and PHB -71 have better combination of cooking quality traits (intermediate GT and AC) than other hybrids. The cooking quality may have influence of location and package of practies which needs further investigation

NUTRIENT RESPONSE AND THEIR USE EFFICIENCY ON SELECTED RICE HYBRIDS PHOSPHOROUS

Manipulation of components of source and sink through agronomic management systems have appeared to be failed to rais the currently operating yield plateauing trend in high yielding rice varieties till now. Thus , the advent of hybrid rice research came to existence and gave optimistic hopes for increase the yield thereby deriving the higher procuctivity under good agronomic management.

Evaluation of 'N' utilization efficiency among the available rice hybrid cultivars with various cultural management practces was studied and found that no hybrid respons beyond 150 kg/N/ha . The knowledge on 'P' and its interaction with 'N' is lacking on hybrids. Added to that the imbalanced nutrient warrants the studies on optimum N and P levels to increase the yield potentiality of hybrids . In accordance with the above requirement trials were initiated on evaluation of P fertrilizer requirement of the hybrids during both kharif and rabi under agro-climatic condition of Tripura.

PRODUCTION FACTOR	EXISTING PRACTICES	IMPROVED PRACTICES	REMARKS
Tillage	Monocropped lowland rice fields are Usually first ploughed following premonsoon showers in may. Inadequate land preparation causes poor germination, early weed infestation, and inefficient utilization of basally applied N- Fertilizer.	Off-season ploughing of field especially during summer to ensure preparation of fine seed - bed at sowing in May and control of early flushes of weeds.	The grain yield of rice increased by 0.8-1.0t/ha due to ploughing in autumn and/or summer compared with Conventional tillage in May. The response to N fertilizer decreased with less number of ploughings due to utilisation of basallly-applied N by the weeds.
Crop Establishment	Broadcasting is followed on large areas in poorly prepared fields which results in inadequate crop Stand.beushaning is practised under shallow water conditions. Transplanting is also done in some areas with weak and unfertilzed seedlings.	Line seeding in finely-prepared field and application of N Fertilizer in the plough furrow at sowing. For transplanted crop, N Fertilizer may be incorporated thoroughly during puddling when water depth is < 20 Cm.	The grain yield and response of rice to N was higher in direct sown than in transplanted rice. Beushaning in shallow water conditions was benificial for weed control in direct-sown rice and higher efficiency of applied N-fertilizer in direct sown rice.
Sowing time	Sowing are done from May-end till monsoon rains render direct seeding infeasible due to waterlogging. The efficiency of N Fertilizer in late-sown crops is low due to poor crop stand.	Sowing from mid-May to May end to ensure better Crop stand and greater efficiency of basally applied N Fertilizer.	The response to N decreased with delay in sowing. The crop sown on May 20 with 40kg N/ha gave the same yield as was 20 kg /ha in the crop sown on May 30th.The loss in yield due to delayed sowing in June was not compensated by using higher dose of N or higher

COATING OF PRILLED UREA WITH NEEM (Azadirachta indica) FOR EFFICIENT NITROGEN USE IN LOWLAND TRANSPLANTED RICE.

The current trend in fertilization of N research is to develop more efficient modified used fertilizer for minimising Nitrogen losses. Nitrification inhibitors for blending urea has shown some promise. Neem has Nitrification inhibiting properties and neem cake coated urea shows more effectiveness than prilred urea for rice and other crops . With the current thrust on sustainable agriculture and organic farming , the use of natural products like neem has achieved a great practical significance, especially in augmenting the N-use efficiency which abysmally low , arround 20-40% under our predominantly subtropical Agriculture. Therefore a field study was undertaken to study the effect of Nitrogen levels and the modified urea materials on productivitly and nitrogen use efficiency of Lowland transplanted rice.

The trial was conducted during kharif 1998 and 1999 at RCD Form , Arundhutinagar. The trial was laid with 13 treatment combination , consisting of 3 levels of Nitrogen (0,60,80, and 100 kg N/ha) and 4 sources of Nitrogen (prilied urea, neemcake- coated ured, 0.5% of 10% neemoil emulsion coated urea and 0.5% of 20% neem oil emulation codted urea) with an additional treatment of a control without Nitrogen were laid out in randomised block design with 3 replication . The nitrogen treatments were inposed in 2 equal splits , half at 30 days after Transplanting (DAT). All plots were given 40kg P/ha and 40kg K/ha as basal. 25 days old seedling of MTU-7029 were trans planted in the 4th week of July at a spacing 20 x 10cm during both the crop years.

Sucessive increase in N level from 0 to 100 kg/ha resulted in significant increase in growth parameters (plant height) and yield attributing characters of rice (productive tillers/ hill, panicle length , filled grains /panicle and grain weight/panicle). Application of modified urea fertilizer viz . neemcake-coated urea and neem oil emulsion coated urea irrespective of the concentrations had benificial effects on all growth parameters and yield attributing charachters over prilled urea.

There was a significant increase in the grain and straw yields of rice with an increase in level of N. Application of coated urea materials e.g neem-cake coated urea and neem oil emulsion coated urea, irrespective of the concentrations, had beneficial effects on grain and straw yields of rice. Apparent recovery of N also influenced significantly due to application of modified urea materials irrespective of concentrations. The highest (47.2% and 43.8%)

yield under all the level of fertilizer application . The crops sown during Sept. 30th and Oct. 15th have suffer from acute Moisture stress at later stage of the crop. Nov 30th, Dec 15th and Dec 30th sown crop also did not perform well in conpai ison to Oct 30th and 15 Nov sown crop. The later sown crop could sustain their yield from dews accumlate in their leaf which have been dropped to root zone. For this leaf characteristics. of the groundnut is is teamed as a self irrigating crop.

However , further investigation is required on the cultivation of groundNut in the upland condition (Tilla land) dependent on the residual Moisture . The similar trial has already been taken this year also.

GROWTH AND YIELD OF WHEAT (TRITICUM AESTIVUM) AS INFLUENCED BY LEVELS OF FARMYARD MANURE AND NITROGEN.

In the rice based cropping system growing of wheat under soils exhusted due to intensive cultivation of high yielding varities of Rice is becoming difficult some. The productivity of a crop is controlled by many factors of which the mineral nutrition specially of Nitrogen is by and large the most important factor . But the heavy and imbalanced use of chemical fertilizer has led to think about the use of organic manures in intersively growing areas for sustainable production system. Therefore to sustain the land and to achieve production potential of crops, Judicious use of fertilizers in integration of organic manures and their scientific management is important kepping in view the above points field investigation was carried our during Rabi 1996-97 and 1997-98.

The experiment was laid out on split plot design with 4 levels of FYM in mainplots and 5 level of N in subplot. The treatment details :-

Main plot : Farmyard Manure.

OM0 - NOFYM

OM1 - 10 MT/ha

OM2 - 20 MT/ha

OM3 - 30 Mt/ha

SUBPLOT = N level.

N0 = 0 kg/ha

In this trial, granules of fipronil (75g a.i/ha) has been evaluated and compared with Standard insecticide Carbofuran (1000g a.i/ha). Among spray formulations, two synthetic pyrethroids lambda cyhalothrin(12.5g a.i/ha) and deltamethrin (10g a.i/ha), were included along with amitraz (300 g a.i/ha) methofenozide (100g a.i/ha), thiocyclam hydrogen oxalate (375g a.i/ha) and thiomethoxam (25g a.i/ha) and compared with standard insecticide chloropyriphos (500g a.i/ha) and untreated control.

Incidence of imsects under different treatment of Insecticide evaluation trial

Insecticide	rate	Stemborer		Leaf folder	Hispa	Gandhibug	Grain field	IOC
	g.a.i/ha	%DH	%WE	ADL/10 hills	ADL/10hills	AN/10h	(kg / ha)	
1. Fipronil 0.4G	75	7.11	12.34	1.7	0.7	3.0	3564	30.25 %
2. Carbofuran 3G	1000	7.47	11.58	2.0	0.9	1.5	3331	21.70 %
3. Lambda cyhalothrin 5 Ec	12.5	11.10	15.67	2.2	1.7	3.5	3021	10.37 %
4. Amitraz 20 Ec	300	9.32	13.34	3.3	2.0	3.2	3099	13.22 %
5. Methofenozide22.9 Ec	100	10.80	18.54	2.6	1.5	2.5	3228	17.93 %
6. Deltamethrin 1.8Ec	10	10.00	16.83	3.9	1.2	1.7	2866	4.71 %
7. Thiocyclam hydrogeno xalate 50 Sp	375	9.81	12.07	3.0	1.7	4.0	3099	13.22 %
8. Thiomethoxam 25 WG	25	12.00	19.99	4.2	1.5	3.7	3021	10.37 %
9. Chloropyriphos 20 Ec	500	8.47	13.44	4.1	2.2	3.5	3279	19.80 %
10. Untreated Control		16.80	26.95	6.6	12.2	15.2	2737	
CD (0.05)							291	
CV (%)							6.4	

ADL=Average damaged leaves

AN= Average No.

H = hill

DH= Dead heart

WE= White ears

Folicure(2ml)	1.7	2.4	1.5	1.8	3025
Kasu-B(2.0ml)	2.0	3.3	1.8	2.7	2969
saaf(1.5g)	2.1	3.9	2.0	3.5	2895
Swing(2.0ml)	1.9	3.0	1.9	3.3	2929
Baan(0.6g)	1.6	1.9	1.5	1.7	3015
Beam(0.6g)	1.6	2.1	1.6	1.9	3006
Check(untreated)	2.3	4.9	2.2	4.7	2469
CD(0.05)	0.2		0.02		133
CV(%)	6.9		8.6		2.7

Test variety - Sambamahsuri(BPT)

No. of sprays: 2

Evaluation of resistance varieties to Bacterial blight of Rice:

29 entries were tested against Bacterial leaf blight consisting of 3 check varieties namely 1R-36, IET-1444 &SWARNA.The plants were artificially inoculated through clip inoculation technique at flag leaf stage and the disease reaction (leasion lenght in cm) on leave were recorded after 15 days of artificial inoculation. The varieties showed resistence are O.M.Der,M. Sungsong, K1.

Table -3:Data sheet for recording bacterial blight reaction

Entries	Grand mean	Reaction(R/S)
IR64	33.32	S
karuna	27.22	S
IR20	22.55	S
IR1545	33.33	S
O.m.der	0.0	R
M.sungsong	0.0	R
K1	0.66	R
K2	26.1	S
K3	28.22	S

Anandhutinagar. This entry also ranked first with an All India Mean grain yield of 5534 kg/ha having 97 days flowering duration. It is significantly superior to National (2114 kg/ha), Regional(2207 kg/ha) and local (2394 kg/ha) checks with 56%, 60.1% and 68.7% respectively.

The second best entry was IET 17246(XR-593) another hybrid with long bold grain, 91 days to flowered,recorded grain yield of 4781 kg/ha. It registered 27%, 30.2% and 37.1% yield superiority over National, Regional and local check respectively.

IET 17243(EXPH 209) ranked third with 4746 kg/ha grain yield. It is a hybrid from Parry Monsanto Limited with long Slender grains & flowering duration of 84 days. This entry registered All India mean grain yield of 5187 kg/ha & ranked 4th. It established 26% yield superiority over Sasyasree(National check), 29.2% over IR 64(Regional check) & 36.14% over Krishna Hamsa(local check).

IET 17248, PRH 122, hybrid from Hindustan Lever Limited with long slender grains rank forth in the trial at this station, with 99 days flowering duration recorded grain yield of 4501 kg/ha. It ranked 2nd in All India mean grain yield (5490 kg/ha). IET 17248 registered 19.5% yield advantage over National check (Sasyasree), 22.5% over Regional check (IR 64) & 29.1% over local check(Krishna Hamsa).

The fifth ranking entry at this station was IET 17249(DRRH-13) with grain yield of 4500 kg/ha. Flowering duration recorded for this entry was 94 days. It showed yield advantage over National check, Regional check & local check by 19.5%, 22.5% & 29.1% respectively.

1.3.2. ADVANCED VARIETY TRIAL-2- IRRIGATED MEDIUM (AVT-2-IM) :

This trial was constituted with 14 test entries (11 inbreds and 3 hybrids) & 4 checks namely Jaya(National), KRH-2(Hybrids), NDR-359(Regional) & DRRH-1(Hybrid) as local check. The trial was conducted at Gakulpur S.M.Farm under South Tripura during Kharif 2002. The performance of entries are tabulated below:-

ET NO	Designation	Days to 50% flowering	Panicle /sqm.	Plant height (cm)	Grain yield (kg/ha)	Grain type
[illegible]21	HKR 96-90	93	407	126	5916(2)	LS
[illegible]3	NDR 3029	92	452	118	5883(3)	MS
[illegible]4	NDR 3023	92	444	128	5350	LB

17115	Siri- 637	106	403	118	5566(5)	LB
17116	Siri-618	93	469	127	5086	SS
17117	Siri-614	106	438	119	5733(4)	MS
17127	OR 1965-6	106	438	115	6333(1)	LS
17128	OR 1967-3	106	434	111	5100	LB
17136	PAU 3075-35-1	106	502	105	5233	LS
17138	RAU 462-86-7-2	92	454	124	5413	LB
17142	MTU 209-20-1-1	93	353	112	4323	MS
17205	MPH5401(hybrid)	89	502	112	4770	MS
17206	MPH 5445(Hybrid)	90	457	124	5040	LB
16836	TNRH31(Hybrid)	85	433	112	3566	LS
Jaya	(NC)	95	453	115	5133	
KRH-2	(Hybrid)	85	400	131	4746	
Narendra-359 (RC)		79	457	103	2666	
DRRH-1		(Hybrid L-C)	92	455	114	4573
Mean		94	442	117	5024	
CD(.05)			989			
CV%		11.9				
D/S		11/07				
D/P		08/08				

Three hybrids & 11 inbred varieties constituted the test entries in this trial. Five best entries at this station were IET 17127, IET 16521, IET 17113, IET 17117 & IET 17115.

All of these entries were inbred varieties. None of the hybrids could exhibit their yield superiority over the inbred test entries in this trial conducted during kharif 2002 at Gakulpur S.M.F. The details of the performance of best five entries are presented below:-

The top ranking entries IET 17127(OR 1965-6) derivative from RTR 14-1-1/ IR 72// Urbashi with long slender grains exhibits a grain yield of 6333 kg/ha with yield advantage over the Jaya(NC), KRH-2(Hybrid check), Narendra 359(RC) & DRRH-1(Hybrid local check) by 23.38%, 33.44%, 137.55%& 38.49%. This inbred showed dominance in yield performance

over the hybrid test entries by 32.77% (MPH-5401) ,25.65%(MPH-5445) & 77.59% (TNRH-[illegible] respectively. IET 17127 established 4th rank in All India Mean grains yield (5483 kg/ha).

The second best culture in this trial, IET 16521, another inbred with long slender grains & 93 days to flower recorded grain yield of 5916 kg/ha. It registered 15.25%, 24.65%, 121.9% & 25.37% yield advantage over national check, hybrid check, regional check & local check respectively.

The third best entry again an inbred variety IET 17113(NDR 3029), derivative from the cross, NDR 3005/NDR 3011/ /Pantdhan-4 with medium slender grains & 92 days flowering duration recorded a grain yield of 5883 kg/ha. It out yielded all the checks with yield superiority at 14.6% over National checks, 22.96% over hybrid checks, 120.67% over the Regional check & 28.65% over local check.

IET 17117(Siri -614), developed from a cross CO-43/IR 50 with medium slender grains & 106 days to flower ranked forth with a grain yield of 5733 kg/ha. It recorded yield superiority over National, Hybrid, Regional & local checks by 11.69%, 20.8%, 115% & 25.4% respectively. This entry ranked fifth in All India mean grain yield (5437 kg/ha).

The fifth best entry IET 17115(Siri -637) with long bold grains & 106 days to flower recorded grain yield of 5566 kg/ha. This culture also ranked third in All India mean yield (5512 kg/ha).

1.3.2. ADVANCE VARIETY TRIAL- 2 BORO, (AVT-2 BORO) :-

The trial was constituted with 3 Nos. of Test entries and compared with 4 checks namely Gautam IR-64, Krishna Hamsa and Vikas as local. The trial was sown on 12th Dec. 2002 and planting was done on 18th January, 2003 at RCDF, Arundhutinagar. Detail performance of the entries in relation to yield, flowering duration, plant height, no. of panicle per sqm. and the grain type are presented in the following table:-

IET NO	Designation	Days to 50% flowering	Panicle /sqm.	Plant height (cm)	Grain yield (kg/ha)	Grain type
[illegible]	RP-2240-59-54	117	574	93	3739	LB
[illegible]	PNR-C-28	113	489	106	5519(4)	LS
[illegible]	PNR-C-9	116	492	106	5001(5)	LS
[illegible]	GAUTAM		115	550	96	5519(4)

IR-64	119	540	103	6677(1)
K.HAMSA	118	633	87	5752(3)
VIKAS	114	567	97	5816(2)
Mean	116	549	98	5432
CV%	5%			
D/S	12/12			
D/P	18/1			

It revealed from the table that none of the test entries exhibits their superiority in yield performance over the check varieties in respect of 1st , 2nd and 3rd position.

IR -64, one of the check variety, ranked 1st with yield of 6677 kg/ha. The flowering durations, plant height and number of panicle/Sqm recorded 119 days, 103 cm and 540 nos respectively.

2nd rank occupied by the local check, Vikas, with grain yield of 5816 kg/ha recorded 114 days, 97 cm and 567 Nos. in respect of flowering duration, plant height and Nos. of panicle/sqm respectively.

Krishna Hamsa(IET-9219) with yield of 5752 kg/ha recorded 3rd in rank in this trial.

4th position jointly occupied by one test entry IET -16825 and a check, Gautam with yield performance of 5519 kg/ha. IET 16825 recorded earliest flowering duration of 113 days among the test entries and the checks in the trial, while Gautam takes 115 days to flower.

IET 16826(RNR-C-9) ranked fifth in respect of yield (5001 kg/ha) with 116 days flowering duration.

1.3.4. INITIAL VARIETY TRIAL- BORO (IVT- BORO) :-

This trial was constituted with the objective "To study the comparative performance of early elite cultures suitable for Boro season." 13 test entries were evaluated against 4 Nos. checks. This trial were conducted at RCDF, Arundhutinagar during Boro 2002-2003.

At the time of harvest entry No 1711 having IET No -18069 did not flower for which the entry dropped from the evaluation process.

The details study in respect of different characters are tabulated below:-

IET NO	Designation	Days to 50% flowering	Panicle /sqm.	Plant height (cm)	Grain yield (kg/ha)	Grain type
17185	RP 2235-159-66-9-SS	115	504	96	5260	LS
17193	CR 691-47	112	608	124	5890(5)	LS
17194	CR 691-58	118	624	115	6762(3)	LS
17196	CR 691-475	117	567	114	6842(2)	MS
17197	CR 749-20-2	116	562	110	6678(4)	MS
17198	BTC E 24/99	116	675	95	5754	LS
17199	BTC E 26/99	113	596	103	4729	MB
17203	RP3512-2641-Gms-39	116	652	105	5200	LS
18067	P-834	121	619	101	5833	LS
18068	P-1040	125	659	104	4858	LS
18070	RNR-C-6	113	717	108	5117	LS
18071	RNR-C-29	113	533	108	5108	LS
Gautam	Check	113	563	101	5715	
IR-64	Check	120	696	101	7071(1)	
K.Hamsa		Check	112	681	93	5135
Vikas	Check(local)	112	712	95	5242	
Mean		116	623	105	5700	
CV%		7.3				
D/S		13/12				
D/P		17/1				

IR 64, a check stood first in the trial with a grain yield of 7071 kg/ha with 120 days of flowering duration.

IET 17196 (CR 691-475) ranked 2nd with a grain yield of 6842 kg/ha. This entry recorded 117 days to flower. It has medium slender grains. It exhibits superiority in yield performance over the checks except IR-64 in the trial. It registered 19.7% yield advantage over Gautam, 33.24% over Krishna Hamsa, 30.52% over Vikas & 3.42% lower than the IR-64.

The 3rd ranking entry was IET 17194(CR 691-58) with grain yield of 6762 kg/ha with long slender grains.This entry recorded 115 days of flowering duration & showed its yield superiority over the checks other than IR 64 by 18.32%, 31.68%, 29% against Gautam , Krishna Hamsa and Vikas respectively.

IET 17197(CR 749-20-2) with grain yield of 6678 kg/ha ranked 4th in the trial. This test entry recorded 116 days of flowering duration with medium slender grains. IET 17197 showed its dominance in yield performance over the check except IR-64, by 16.85% to Gautam, 30% to Krishna Hamsa and 27.39% to Vikas.

The 5th ranking entry is IET 17193 (CR 691-47) with a grain yield of 5890 kg/ha with 112 days of flowering duration. It has long slender grains. It exhibits yield superiority over the checks, except IR-64, in the trial by 3% over Gautam ,14.7% over Krishna Hamsa and 12.36% over the local check Vikas.

HYBRID RICE :-

1.3.5. INITIAL HYBRID RICE TRIAL- EARLY (IHRT-E) :-

Eleven early duration hybrids, seven from public sector and four from private sector were evaluated alongwith three checks, Annada as national check, NDR-97 as regional checks and Vikas as local checks.

Performance of the entry, hybrids, are given below:-

Name of Hybrid	Nominating agency	Days to 50% flowering	Spikelet * SS	Spikelet * FS	No.of panicle /Sqm	Grain yield (kg/ha)
HKRH-1055	Karnal	77	69	124	270	4280
HKRH-1076	Karnal	79	70	102	281	4337(5)
KJTRH-2	Karjat	91	56	131	346	5260(1)
DRRH-18	Hyderabad	79	50	101	339	4610(3)
DRRH-19	Hyderabad	92	49	92	276	4030
DRRH-20	Hyderabad	91	66	132	292	4370(4)
DRRH-21	Hyderabad	77	43	113	244	3860
PAC-80008	Advanta India Ltd.	77	45	88	246	4050
EXPH-355	Parry Monsanto	87	42	141	275	4207

MRP-5603	Mahyco	77	31	111	313	4770(2)
MRP-5951	Mahyco	74	48	97	248	3550
Armada	(N.C)	74	18	81	249	3397
NDP-67	(R.C)	67	20	50	217	3190
Vikas	(L.C)	74	43	112	312	3440

* Average of 25 panicles per plot.

The seeds were sown on 22.06.2002 & planted on 18.07.2002 at R.C.D. Farm Arundhutinagar.

The first ranking hybrid KJTRH-2 with a grain yield of 5260 kg/ha recorded an yield advantage of 52.9% over the best check Vikas(Local) at this station while it ranked 3rd in All India mean grains yield (6068 kg/ha). The hybrid, MRP-5603, ranked 2nd with a grain yield of 4770 kg/ha. This hybrid also established its 2nd position in All India mean grains yield(6104 kg/ha). MRP-5603 recorded yield advantage of 38.60% followed by DRRH-18(34%), DRRH-20(27%) and HKRH-1076(26%) over the best check Vikas (Local) with ranking of 3rd, 4th and 5th respectively. In All India mean grain yield the hybrids DRRH-18, DRRH-20 and HKRH-1076 ranked 11th ,5th and 4th respectively.

Based on the yield performance the following hybrids, which have recorded a yield advantage over 10% against the best check(Vikas) at this station are tabulated below:-

Sl.No.	Hybrids	Yield Advantage(kg/ha)	Yield advantage (%)
1	KJTRH-2	1820	52.9
2	MRP-5603	1330	38.6
3	DRRH-18	1170	34.0
4	DRRH-20	930	27.0
5	HKRH-1076	897	26.0
6	HKRH-1055	840	24.4
7	EXPH-355	767	22.3
8	PAC-80008	610	17.7
9	DRRH-19	590	17.1
10	DRRH-21	420	12.2

1.3.6. INITIAL HYBRID RICE TRIAL- MID- EARLY (IHRT-ME) KHARIF 2002:

Twenty one hybrids of mid early duration, nine from public sector and twelve from private sector were evaluated alongwith three checks(National-Sasyasree, Regional-IR 64 & local check- Krishna Hamsa) at RCDF, Arundhutinagar during kharif 2002. The sowing of seeds were done on 22.06.02 planted on 18.07.02.

Composition of the trial alongwith the performance of 21 hybrids at this centre and the date of 50% flowering is presented in the table next;

IET NO	Designation	Days to 50% flowering	Panicle /sqm.	Plant height (cm)	Grain yield (kg/ha)	Grain type
DRRH-22	Hyderabad	91	53	139	342	5213(4)
UPHR-1010	Pantnagar	91	66	144	333	3837
UPHR-1554	Pantnagar	89	39	157	215	4277
UPHR-1978	Pantnagar	81	71	136	339	4007
HKRH-1064	Karnal	81	49	161	294	5050
HKRH-1094	Karnal	83	59	110	254	3227
HKRH-1102	Karnal	87	47	129	283	4067
TNRH-58	Coimbatore	92	77	121	326	4550
MTUHR-2070	Maruteru	97	62	143	262	3083
EXPH-209	Parry Monsanto	81	31	138	302	4740
EXPH-261	Parry Monsanto	85	56	157	395	5720(1)
EXPH-367	Parry Monsanto	82	45	163	381	4543
EXPH-668	Parry Monsanto	105	27	226	379	5580(2)
HRI-145	Hybrid rice Intl.	83	34	164	348	4847
HRI-146	Hybrid Rice Intl.	85	60	142	326	4627
NRH-52	Nath Seeds	80	40	128	289	3527
IAHS-200-010	Indo-American	84	44	120	324	5033
IAHS-200-011	Indo American	90	62	142	301	5080(5)
MRP-5303	Mahyco	81	24	195	352	4803
PRH-129	Hindustan Lever	99	53	185	391	5460(3)

UPHR-1745	Pantnagar	76	55	105	229	3120
SASYASREE	(National Check)	83	40	119	277	4023
IR-64	(Regional Check)	92	47	102	238	3680
KRISHNA-HAMSA	(Local Check)	83	33	105	277	4567

*Average of 25 panicles per plot.

On the basis of the yield advantage over 10% of the best check (Krishna Hamsa)at this location are tabulated below:-

Sl.No.	Hybrids	Yield advantage(kg/ha)	Yield advantage (%)
1	EXPH-261	1153	25.25
2.	EXPH-668	1013	22.18
3.	PRH-129	893	19.55
4.	DRRH-22	646	14.14
5.	IAHS-200-011	513	12.33
6.	HKRH-1064	483	10.58
7.	IAHS-200-010	466	10.20

1.3.7. INITIAL HYBRID RICE TRIAL- MEDIUM (IHRT-M) KHARIF 2002 :-

Twenty three medium duration hybrids, ten from public sector and thirteen from private sector were evaluated at RCDF, Arundhutinagar along with four check(Hybrid check-KRH-2 National check- Jaya, Regional check- NDR-359 & Local check- Salivahana). The seed materials were sown on 04.07.02 and transplanted on 09.08.02.

Performances of twenty three hybrids alongwith the checks on different parameter at this station is given below:-

Name of Hybrid	Nominating agency	Days to 50% flowering	Spikelet * SS	FS	No.of panicle /Sqm	Grain yield (kg/ha)
PERH-1056	Kapurthala	98	403	32	122	4607
PERH-1086	Kapurthala	98	397	42	127	2980
PERH-1091	Kapurthala	96	322	38	141	3558

Date of transplanting	-	9.2.2003 to 28.2.2003		
Date of harvesting	-	June 2003		
Seed Rate	-	20 kg/ha(8 kg/acre).		
Fertilizer dose(Kg/hac)	-	100:50:50(NPK)		
Spacing	-	20 x 15 cm		
Yield range(kg/ha)	-	(1) Melagarh	-	8000 to 9500
		(2) Bagafa	-	6750 to 7672
		(3) Panisagar	-	5230 to 7700
		(4) Kanchanpur	-	5575 to 8455
Mean yield(kg/ha)	-	Melagarh	-	8563
		Bagafa	-	7329
		Panisagar	-	6347
		Kanchanpur	-	7257
State Mean yield (kg/ha)	-			7374

3. STATE COMPOSITION TRIAL

3.1. EVALUATION AND MAINTENANCE OF LOCAL GERM PLASM :

32 Nos. local germplasm of rice was evaluated , documented and maintenance were done during kharif 2002-03 at RCDF, Arundhutinagar for future breeding programmes.

It is very much pertaining to develop in-situ preservation infrastructure at RCDF, Arundhutinagar for such valuable materials available in Tripura which are going to extinct from the state.

3.2. MULTI LOCATIONAL VARIETAL TRIAL IN BORO.

In Tripura climatic conditions differ from district to district, resulting in yield difference specially in Boro Rice. It is therefore essential to isolate suitable rice genotype for particular district to achieve higher production in the state. Keeping in view multi location varietal trial in Boro were conducted at 4 departmental farm namely , RCDF, Arundhutinagar and Nalchar SMF under West Tripura District,

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Date of harvesting	-	June 2003		
Seed Rate	-	20 kg/ha(8 kg/acre).		
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Gakulpur SMF under South Tripura District and Churaibari SMF under North Tripura District during Boro 2002-2003. This is the 2nd year of testing. The compositions of the trial are :-

IET No.	DESIGNATION	CROSS COMBINATION	GRAIN TYPE
12888	KAU 8870	Br-51/cultue 23332-2	LB
3116 (Vikas)	RP-6-51-31-6	TKM6/IR-8	MS
17193	CR-691-47	CR-1064-5/Dular	LS
9219(K.Hamsa)	RP-1451-92-21-9	Rasi/Finegora	LS
8883	RP-2240-59-54	RP143-4/Phalguna	LB
17199	BTC E26/99	IR 20/P 269	MB
2815(Sasyasree)	RP6-516-34-1-8	TKM 6/IR-8	LS
8886	RP 2240-86-84	RP 143/Phalguna	LS
16826	RNR-C-9	Tellahamsa/IET 4786	LS
9671(IR-64)	IR-18348-36-3-3	IR 5657-33-2-1/IR 2061-465-1-5-5	LS
11005(NDR-359)	NDR-359	BG 90-2-4/OBS 677	SB
17613	CR 918-18	HPU 824/P 615	MS
17197	CR 749-20-2	Sattari/Jaya	MS
17611	CR 691- 475C	1064-5/Dular	MS
17612	CR 898	China-45/dwarfmutant	MS
723 (Jaya)	12306	TNI/TN 141	LB
17194	CR 691-58	CR 1064-5/Dular	LS

The detail performance of entries in respect of grain yield and the days to 50% flowering are presented in table No.1 and table No.2 respectively.

Table No.1: Grain yield (kg/ha)

IET NO	RCDF Arundhutinagar	Nalchar SMF	Gakulpur SMF	Churaibari SMF	Overall Mean
12888	6825(4)	7683(1)	4229	6708(2)	6361(1)
3116 (Vikas)	5827	6850(4)	4308	5917	5725
17193	6265	6100	5083	6583(3)	6008(5)

9219(K.Hamsa)	6422(5)	4883	4412	6250(5)	5492
8883	6260	6283	4058	4375	5244
17199	5020	5883	5192(5)	5000	5274
2815(Sasyasree)	5545	4983	4400	5417	5086
8886	5577	5233	5092	3208	4777
16826	6075	4467	-	-	5271
9671(IR-64)	6827(3)	6983(3)	4512	7000(1)	6330(2)
11005(NDR-359)	5600	5750	4158	6333(4)	5460
17613	6945(2)	6317(5)	5512(2)	5500	6068(4)
17197	5540	6217	5217(4)	5083	5514
17611	6947(1)	5517	5475(3)	6333(4)	6068(4)
17612	6295	7433(2)	4746	6125	6150(3)
723(Jaya)	5262	4017	4258	5958	4874
17194	5920	3767	5958(1)	6333(4)	5494
Exp.Mean	6068	5786	4788	5757	5600
CV%	5.29	7.4	8.50	15.00	
D/S	20.12.2002	15.01.2003	13.12.2002		
D/P	25.01.2003	23.02.2003	18.01.2003		

Table-2:- Days to 50% Flowering.

IET NO	RCDF Arundhutinagar	Nalchar SMF	Gakulpur SMF	Churaibari SMF	Overall Mean
12888	114	-	100	125	113
3116 (Vikas)	110	-	93	117	107
17193	111	-	93	117	107
9219(K.Hamsa)	111	-	103	123	112
8883	109	-	103	123	112
17199	114	-	107	117	113
2815(Sasyasree)	112	-	121	123	119

station. Hence IR-64 may be recommended for cultivation in Boro widely in Tripura.

IET 17612(CR-898) a new culture stood third in all Tripura mean grain yield(6150 kg/ha) with 125 days to flower. This entry exceeded the yield performance over the established variety(Jaya) by 26.2%. This culture ranked 2nd at Nalchar SMF with a grain yield of 7433 kg/ha.

The 4th rank occupied jointly by IET 17611 & IET 17613 with grain yield of 6068 kg/ha. These varieties exceeded over Jaya in yield performance by 24.5%. In regards to flowering duration IET 17611 recorded 110 days whereas IET 17613 recorded 111 days.

IET 17193(CR-691-47) a derivatives from the cross CR 1064-5/Dular stood 5th position in all Tripura mean grain yield(6008 kg/ha) with 107 days to flower.

3.3. HYBRID SEED PRODUCTION OF RICE:

DRRH-1.

Hybrid Rice seed production programme initially started in the year of 1998-99(Boro) and still continued upto Boro 2002-2003 in Tripura.

Year-wise productivity are tabled below:-

BORO

Year	Qty.produced(kg)	Yield(kg/ha)	Location
1998-99	23	450	RCDF
1999-00	137	1900	RCDF,Gakulpur
2000-2001	340	2700	RCDF,Gakulpur
2001-2002	237.5 kg	2923	RCDF,Gakulpur, Churaibari
2002-2003	360 kg	2663	RCDF,Churaibari

*Yield/ha at RCDF obtained 3357 kg/ha whereas at Churaibari it was 2163 kg/ha (2nd year).

This achievement is mainly due to the contribution of knowledge gathered in syncronisation of flowering of parental line from the previous year and also modification of hybridization technique in Tripura. The date of Boro 2002-2003 at Gokulpur SMF could not be incorporated due to some technical default in cultivation.

KRH-2:-

KRH-2 is a public breed hybrid rank 1st position in All India level with regards to grain yield. Considering its importance Plant Breeding Division of RCDF initiate a programme with the help of Dr B.Vidyachandra, Prof. (Hybrid Rice) Regional Research Station V.C.Farm, Mandya, Karnataka for producing KRH-2 seeds in the State itself. Accordingly with the parental line supplied by respective scientist, KRH-2 seed production started at RCDF during Boro 2002-2003 in a area of 489 sqm. The hybrid seeds of 120 kg was produced from that area with a productivity of 2454 kg/ha which will likely be increased in subsequent year.

3.4. MAINTENANCE /PRODUCTION OF DIFFERENT PARENTAL LINE:

Genetically pure parental line contribute production of true hybrid seed. To produce these parental line plant Breeding division of RCDF, Arundhutinagar taken up the programme during Boro 2002-2003 to produce/maintenance of parental line in the state. Accordingly the quantities of parental line were produced during Boro 2002-2003.

IR 58025 A - 53 kg

IR 58025 B - 38 kg

IR 40750 R - 73 kg

KMR-3 - 70 kg

These parental line will be distributed among the selected cultivators for production of hybrid seed in Tripura during ensuing Boro season as per council of Ministers decision as one of the "identified issues".

3.5. DEVELOPMENT OF NEW HYBRID CULTURE:-

Plant Breeding division of this station started the hybridization programme on rice to develop new hybrid culture fit for irrigated ecosystem of Tripura since 2000-2001(Boro). This year is the 3rd year where two cultures were evolved namely ARH-1 and ARH-2. During 2002-2003 the following quantity of hybrid seeds were obtained which will be tested in cultivators field during Boro 2003-2004

Name of Hybrid	Qty. produced (kg)
ARH-1	10 KG
ARH-2	57 KG

3.6. PULSES (RAJMASH)

Adaptive Trial of a profitable crop Rajmash(Var- local Red) were received from Bomdila, Arunachal Pradesh were sown at RCDF on 4th Feb.2003 for evaluation under local climate condition. Flowering initiation was started on 9th March 2003 just 34 DAS. Other observation recorded on this crop are-

Days to Pod initiation	-	40 days
Harvesting was done	-	5th April, 2003(60DAS)
No.of Pod/Plant	-	17 Nos.
Nos.of grain/Pod	-	5 Nos.
Grain yield obtained	-	880 kg/ha.

4. LAND TO LAB INTERACTION :-

Conduction of land to lab farmers interaction and the research feed back was done at district headquarter with the 50 Nos. of farmer in South Tripura during 2002-2003 where present status of farming system and the future research needs were discussed. This will help the research worker to identify the issue to be incorporated for the future research works.

AGRONOMY

RESEARCH ACHIEVEMENTS

1996-2002

CO-ORDINATED RESEARCH

Rice :-

P- FERTLIZER SAVING TECHNIQUES FOR TRANSPLANTED RICE.

In the past , the growth in rice production can be attributed to single Nutrient i.e. nifrogen, there by 'N' is being used as a shovel to help the process of mining for other nutrients like P.K. Zn and S. Data from several other experiments have shown that the Depletion of Pd by Crop removal in the range of 33 to 129 per cent or more in plots which were regularly fertilized with N as compared to the unfertilized plot; the rate of depletion being maximum in alluvial soils and minimum in red soils . The present trend of fertilizer use in the country as well as in our state exhibit an adverse impact on NPK consumption and balanced nutrient use mainly because of under dosinig of P fertilizers

Now In order to encourage P fertilizer use and enhance 'P' use efficiency it is necessary to develop appropriate saving Techniques so as to economise the cost of P fertilizer to the extent possible.

Trial was conducted under co-ordinate programme to study response of variety , to isolate suitable source and method of application of P fertilizer under rainfed lowland on Transplanted rice. The trial was conducted for 3 consecutive year since 1995 .

Result of Alluvial soils of Arundhutinagar shows variety Avhaya as 'P' responsive variety with an average yield of 4.54 mt. against tulshi and Rashi . Among different source and application methods of 'P' highest grain yield obtained from the treatment with soil application of DAP and followed by the treatment of spray of 2 % DAP at maximum tiliering and boot leaf stage. Among the interaction variety and P (variety x p) application highest grain yield obtained in Abhaya from soil application of DAP followed by nursery application of DAP.

WEED MANAGEMENT ON DIRECT SOWN RICE IN RAINFED UPLAND ECOSYSTEM

During kharif season the efficiency of herbicides viz anilophos 30 EC .... Butachlor + Safener 50 EC, Pendimethalin and 24 DNA 80 wp were tested against hand weeded pilots and non-weeded control under rainfed upland rice at Arundhutinagar . The herbicide were

INFLUENCE OF DATE OF PLANTING AND NITROGEN LEVELS ON GRAN YIELD AND QUALITY OF SCENTED RICE VARIETIES.

Timely planting plays a decisive role in affecting grain yield, quality and response to applied fertilizers particularly nitrogen. In order to explore the potential production, quality and response to added nitnogen for newly developed some dwarf and traditional Scented rice varieties , date of planting x nitrogen x variety trial was conducted under Agro-climatic situations of Tripura at Arundhutinagar during 1996 and 1997.

The 10th August planting recorded significantly higher grain yield of 4.49 t/ha(13.1 %) than the mean grain yield of 31st July planting (3.87 t/ha_. Averaged over date of planting , variety IET-13548 recorded significantly higher grain yield of 4.36 t/ha than the mean grain yield of Taraoribasmati (4.10 t/ha) . Graded leavels of N produced limearly higher grain yield upto 90 kg N/ha (4.94 t/ha). The per cent increase in grain yield over control was of 43.2, 54.5 and 64.1 under 30,60, and 90 kg N/ha respectively. Averaged over varieties the mean N response at 30, 60, and 90 kg N/ha was 43.3 , 27.3 and 21.4 kg grain /kg N , respectively. The interaction effects among varieties x dates x N levels showed that variety IET-13548 recorded maximum grain yield of 5.65 mt/ha under 10th August planting with 90 kg N/ha. the mean maximum panicle number (258/m^2) and panicle weight (2.99 gm) were registered by IET-13548. Similar trial was conducted in the crop year 1996 also with variety pusa Basmati-1 and Taraori basmati wherein 20th August planted crop recorded significantly higher grain yield of (2.55 t/ha) than 10th August planting (2.31 t/ha) Between the test varieties pusa Basmati-1 recorded significantly higher grain yield (2.89 t/ha) over the mean grain yield of Taraori Basmati (2.00 t/ha) and worked out to 44.5 percent increase in grain yield . Pusa Basmati -1 recorded Maximum N- response of 14.0 kg grain followed by 11.0 kg grain/kg N, respectively at 10th and 20th August planting at initial level of 30 kg N/ha.

Averaged over varieties and dates of planting incremental doses of Nitrogen increased the grain yield significantly upto 60 kg N/ha (2.62 t/ha)and there after additional dose of Nitrogen reduce the yiel . the percent increase in grain yield at 30, 60 and 90 kg N/ha over control was 10.41 18.55 and 16.29 respectively . The N response at graded levels of Nitrogen was of 7.7, 6.8 and 6.0 kg grain /kg N, respectively . The interaction effect between nitrogen x dates and variety x nitrogen indicated the maximum grain yield of 3.39 t/ha was recorded by pusa Basmati-1 at 90 kg N/ha under 29th August planting over rest of the treatments except the grain yield recorded by the same variety at 60 kg N/ha (30.07 t/ha) on 20th August planting.

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HYBRID RICE

Many available indications on rice production and productivity growth in India are suggestive of the fact that future increases in rice production will have to be achieved from less labour , limited availability of water and at the same time reducing the fertilizer use. in this endeavour , exploiting the full heterotic potential of recently released hybrid rice varieties is a must . To develop suitable production technology trials covering nursery management , seedling rate , planting date fertilizer management and water management has been initiated under Agno-climatic condition of Tripura.

SEEDING DENSITIES AND SEEDLING RATES FOR HYBRID RICE VARIETIES

Hybrid rice seed costs more and needs replacement every season , it is necessary to reduce the cost of seeds by optimising seed rate through appropriate adjustment of seeding density in nursery and seedling number per hill while planting .

Averaged over hybrids and seedling rates , significantly higest grain yield was recorded with the seed density of 20 kg /m^2 (7.52 t/ha) The seedling rate 2/hill recorded significantly maximum grain yield of 7.14 t/ha over single seedling /hill . A significantly linear reduction in grain yield was recorded from 20 gm sq mt to 30 gm/sq/mt where in linear progression was found from 10 gm/mt^2 to 20 gm /mt^2.

DATE OF PLANTING ON THE GRAIN YIELD OF HYBRID RICE DURING KHARIF

A significantly linear reduction in grain yield was recorded from 26th July to 30th August planting from 6.29 t/ha (26th July) to 3.72 t/ha (30th August) . The percentage reduction in grain yield recorded was of the order of 10.81 , 25.91 and 40.68 percent under 5th August , 13th August and 30th August respectively as compared to the mean grain yield of 26th July planting , while 16.93 and 33.69 percent recuction in grain yield was recorded under 13th August and 30th August planting as compared to the grain yield of 5th August planting .

Among the test varities pro-Agro-103 recorded significantly maximum grain yield of 5.69 t/ha as compared to grain yield of KMRH -2 (4.66t/ha) , DRRH-1 (5.32 t/ha) and CNHR-3 (4.61t/ha). the next higher yielded variety DRRH-1 produce significantly maximum grain yield over KMRH-2 and CNHR-# while differences between KMRH-2 and CNHR-3 were found to be non-significant.

The dates of planting x variety interaction indicated that 26th July planting gave maximum grain yield of 7.33 t/ha and 7.07 t/ha pro-Agro-103 and DRRH-1 respectively. the maximum

panciple number (256/m2) and panicle weight (2.15 gm) was recorded under 26th July planting by variety Pro-Agro-103.

DATE OF PLANTING OF HYBRID RICE DURING RABI

The mean grain yield was linearly reduced with delayed planting from 24th Dec (10.7t/ha) to 10th February (3.51 t/ha) . The percent reduction in grain yield recorded was of the order of 67, 38 and 1.5 with 10th Feb, 25th Jan. and 10th Jan plantings , respectively over the grain yield of 24th Dec planting 24th December and 10th January planting were found to be ideal for obtaining high yields. Among the hybrids tested pro-Agro and Indo American Hybrids recorded significantly higher and comparable yields (8.7t/ha) than the other two hybrids (6.9t/ha). Based on ancillary charachters, the first two dates (early planting) recorded significantly higher panicle number and panicle weight . Among the hybrids tested (IAHB-4, Pro-Agno-6201 GK-5006, VRH-4) Indo American Hybrids -4 registered maximum grain yield because of highest panicle weight (3.2 gm) even though panicle number was the lowest (270/m2) . the result suggests that the maximum yield potential can be realised from rice hybrids by planting the crop on 24th Dec. to 10th January period.

Further studies on the appropriate nursery technology , date of sowing , date of planting on Boro Rice and Hybrid rice is going on. Studies on these are required to increase the cropping intensity under rice based cropping pattern and cropping system.

NITROGEN RESPONSE AND NUTRIENT USE EFFICIENCY ON HYBRID RICE VARIETIES DURING KHARIF

Deceleration in Nitrogen response rate and grain yield plateauing of rice in intensive cultivated areas, of late gained topical interest. To address these wide spread second generation problems. Strategic studies were felt necessary . In this endeavour exploiting the heterotic potential response of newly developed hybrid rice varieties to applied nitrogen is one appaoach to identify the differential response of some hybrids for wide ranging production environments. Thus nitrogen x variety trial was initiated during kharif 1995 which continued till kharif 1997. Hybrids along with one local check were evaluated under 5 levels of Nitrogen viz, 0, 50, 150, and 200 kg N/ha during all the three years consecutively.

During 1995 both Hybrid rice varieties viz . pro-Agro and CNRH-1 produced comparable maximum grain yield at 100 kg N/ha (5.50 and 5.36 t/ha) which are significantly superior to Jaya a local check at the same level or different levels of N application . Averaged over test

The hybrid VRH-4 recorded the highest mean grain yield of 8.1 t/ha when averaged over N levels. Averaged over varieties, graded levels of Nitrogen increased the grain yield significantly upto 150 kg N/ha (8.83t/ha). there was significant yield reduction at 200 kg N/ha level. The percent increase in grain yield at 150 kg N/ha level over 0,50, and 100 kg N/ha accounts to 131.2, 84.3 and 29.6 nespectively. The N response at graded levels of N were 19.4, 29.9, 33.4 and 23.5 kg grain/kg N, respectively.

In the year 1998 the result of the similar trials shown that among different N levels used , 150 kg n/ha recorded significantly higher grain yield (6.37t/ha) and N response (49.5 kg grain /kg N) over others. Same trend was observed both in number of panicles /m^2 and panicle weight . Singnificant interactions were observed among varieties and Nitrogen Levels DRRH-1 and pro-Agro-103 recorded significantly higher yield of 7.00 and 7.04 t/ha , respectively at 150 kg N/ha and found to be superior over all other treatment combinations indicating the optimum N requirement obseavation of the ancillarcy charachters viz panicle number, panicle weight are also relecting same trend.

Treatment N)	Grain yield (t/ha)	Panicles /m2	Panicle wt(gm)	N.resp(kg grain/kg
		Mean of varieties		
V1	4.54	227	3.56	
V2	5.00	281	2.38	
V3	5.21	269	2.70	
V4	5.13	245	2.01	
CD (0.05)	NS	14	0.13	
CV (%)	15.02	7.51	6.73	
		MEAN OF NITROGEN		
N0	3.22	224	2.27	---
N1	4.34	254	2.55	25.8
N2	5.09	259	2.81	36.7
N3	6.37	279	3.04	49.5

N4	5.81	261	2.63	44.6
CD (0.05)	0.22	9	0.18	
CV (%)	5.39	440	8.17	

NITROGEN LEVELS

NO = 0kg/ha

N1 = 50 kg/ha

N2 = 100 "

N3 = 150 "

N4 = 200 "

VARIETIES

VRH -4

DRRH-1

PRO-AGRO-103

IET-4094

CROP MANAGEMENT TECHNIQUES FOR DIRECT SEEDED RICE UNDER PUDDLED CONDITION

There are several advantage associated with direct seeding practice and the practice of direct seeding of sprouted seed is possible in all levelled land with good water control. The practice of direct seeding may reduce the labour requirement and duration of crop to some extent and provide comparable grain yield with irrigated transplanting . In addition to minimise the labour problem during peak period of Agricultural activities , the direct seeding to a greater extent aplly suits for regions where delayed transplanting is common , due to late arrival of moonsoon or usual delay in irrigation water supply through canal system . In our situation 1st Kharif rice crop (Aush) can be grown up with this system.

The following were the treatment :-

Treatment No	Treatment details]
T_1	Farmers practices of Transplanting + N:P:K 40:20:20 kg /ha as per farmers application practice.
T_2	Transplanting in lines + 60 : 30 : 30 NPK kg/ha + weedicid 4-6 DAT (N-3 splits - 50% Basal + 25% . Tillering + 25% panicle , P- all basal + K- 2 split -75% basal + 25 % PI)
T_3	Broadcasting of sprouted seed 100 kg/ha = 60 : 30 : 30 NPK kg/ha (Fertilizer application as T2
T4	Broadcasting of sprouted seed @ 100 kg /ha + NPK 60 : 30 : 30 kg /ha +

weediceid 4-6 days after Sowing (DAS) fertilizer appl as T2) + one hand weeding at maxmum tillering stage.

T5 Wet seeding in lines + 60 : 30: 30 : NPK kg/ha to be applied as T2 + weediced at 6 DAS + one hand seeding at maximum tillening stage.

T6 Farmers practice of Broadcasting @ 100 kg seed /ha + N : P : K 40 : 20 : 20 kg/ha

T7 Dibbling of dry seed @ 100kg/ha in line + N:P:K 40 : 20: 20 kg/ha + 2 hand weeding.

Critical analysis of the trial results indicate that under intensive crop management Direct seedign in the foam of sprouted seed (T4) can produce grain at the conpanable level of yield under transplanted condition (T2) . the wet seeding in lines also shows encounaging result . In the three consecutive years since 1997 the trial was repeated under upland rainfed eco-system (not tilla land) as 1st Kharif crop (Aush) . the variety IET-1444, Annada, and TRC - 87-251 was tried . the performance of TRC -87-251 (3.24t/ha) at T2 and Aunada (3.4t/ha at T_2)under most of the treatment was found satisfactory . Still it has been percieved that specific variety for Direct seeding cultivation practices may need to be developed

However , in fine it can be concluded that direct seed cultivation practices under puddled condition will require adequate crop management which may be more than transplanting edcrop in some cases . The yield of treatment - T4 was next to T2 (transplanting) in all the three years . Further investigation is under progress.

YIELD MAXIMISATION OF RICE

Grain yield maximisation of any variety depends on the process associated with uptake of nutrients , translocation , parittion , assimilation and remobilisation at different growth stage of crop. These multitude processes are influenced by genetic potential of the variety , cultura practices soil manipulations (soil factors) climatic factors and efficient management of input . In this pursuit , of yield maximisation study and trial conducted in the recent past reveale that the imbalanced nutrients use is the king pin for the currently observed stagnation in yi levels which could be reversed by resorting to conjunctive fertilization with micro nutrier under optimum plant density. As such the trials were coustituted incorporating the differe NPK ration along with balanced nutrients , to develop suitable agronomic package of pr

tices for breaking the stagnation and maximining the grain yield.

The trial on yield maximisation was conducted for 3 consecutive years during Kharif season . Under lowland rainfed situations at Arundhutinagar grain yields of IET-9219 was significantly influenced by different treatments. The mean maximum grain yield (5.24mt/ha) was recorded by treatment T4 recieving recommended fertilizer done (80 : 40 : 40 kg NPK/ ha) in conjunction with Fym (10t/ha) followed by grain yield of 5.13 t/ha which was recorded under treatment T5 and T6 recieving recommended fertilizer done + ZnSo4 (20kg /ha) , and recommended fertilizer done + Mgo (20kg/ha) respectively . the grain yield differences among treatment T3, T4, T5, T6 and T7 were not significant . Application of Fym and micro-nutrients showed positive effect along with recommended fertilizer dose.

Data on Grain yield and ancillary charachters of yield maxinisation trial.

Treatments	Grain yield (t/ha)	Panicle /sqmt	Panicle weight (gm)
T1 - Control No NPK with 20 x10cm spacing.	3.14	259	2.40
T2 - RFD (80:40:40 kg NPK/ha) 20 x 10cm spacing	4.60	296	2.46
T3 - 150% RFD 20x10cm spacing	4.94	283	2.80
T4 - RFD + Fym 10 t/ha 20 x 10 cm spacing	5.24	319	2.64
T5 - RFD + ZnSo4 (20kg/ha) 20 x 10cm spacing	5.13	305	2.20
T6 - RFD + Mgo (20kg/ha) 20 x10cm spacing	5.13	284	2.17
T7 - RFD + Basic slag (800kg/ha) 20 x 10cm spacing	5.03	318	2.43
T8 - N:P:K 60:20:20 kg/ha (50 % of RFD) with random planting (Farmers practice of planting)	3.50	272	2.19
Experiement Mean	4.59	292	2.41
CD (0.05)	0.58	NS	NS
CV (%)	7.2	12.5	12.7

VARIETY - IET- 9219

Critical analysis of yield data of the trials of three consecutive year ws similar trend as

result depicted above . However further investigation on yield maximisation are to be studied to explore the extent of contribution of different component other than NPK.

INFLUENCE OF FERTILIZER SCHEDULE ON GEAIN YIELD AND QUALITY OF HYBRID RICE DURING KHARIF

During the year 1999 trial on influence of Fertilizer schedule on grain yield and quality of hybrid rice were laid down at Arundhutinagar.

The application of fertilizer Dose M2 (150 : 60 : 40 kg NPK /ha + FYM Uo + /ha) recorded significantly maximum grain yield (5.14 +/ha) over rest of the fertilizer schedules (32.47 to 53.54%) . The grain yield differences between fertilizer doses of (M/.50 : 60 : 40 kg NPK/ha) and theatment M3 (M1 + 20 kg Zn so4 kg/ha) were not significantl . PHB-71 recorded maximum grain yield (5.63t/ha) and compariable with DRRH-1 (5.27 +/ha).

Among tested bybrids PHB-71 recorded mean maximum values of hulling (79.7 %) , milling (75%) kernal length (6.84 mm) and L/B ratio (3.34) in compaison to DRRH-1 and jaya . Application of fertilizer dose of 150 :60 :40 NPK kg/ha + Fym 10 +/ha recorded mean maximum values of hulling (79.9%) , milling (75.2%) and kernal breadth (2.27 mm) while mean maximum values of head rice recovery (65.8%) kernal length (6.49mm) and L/B ration (3.10) were noticed under 150 :60 :40 kg NPK only . However , maximum meany values of head rice recovery (69.4%) and kernal breadth (2.46mm) were recorded by DRRH-1 and local check (Jaya)respectively.

During 2000 the similar trial was repeated where in DRRH-1 , PHB-71 produced nearly the same grain yield (9.3t/ha) which was at par with the local entry pro-Agro-6201, while MTU-7029 produced. Signaficantly lower grain yield as compared to hybrids.

Table on Grain yield / ha.

Treatment	varieties	yield t/ha
H1	DRRH-1	9.31
H2	PHB-71	9.37
H3	ADTHR-1	8.91
H4	KHR-2	8.04
H5	EXPH-204	8.29
H6	PA-6201	9.12
H7	MTU-7029	6.19

The result of Kharif 1998 trials shows that optimum dose of 120 kg + to 60 kg p205 + 50 kg k20/ha combination is found to be the best package in terms of Nutrient response . Among the hybrids /varieties tested for their response to applied N and P for their yield potentiality , the hybrid VRH-104> HRI-129>HRI-119 performed better in orded to response . The increased level of P application decreased the nutrient response under moderate levels of N(90-120kg/ha) while the response at higher level of N(150kg/ha) is nearly constant. However, the mean grain yield increased with increasing nutrient level. The yield data and other ancillany charachters of 2000 kharif trials indicating incremental dose of applied nutrients (N and P) increased grain yield significantly upto (8.17 t /ha). Interaction effect between hybrids x Nutrient levels indicated that PHB-71 (8.67t/ha) recorded maximum grain yield at N150 +P60 + k50 followed by Pro-Agno 6201 (8.24t/ha).

During Rabi 1998-99 the trial on P response were laid at Arundhutinagar where HRI-129 recorded the mean maximum grain yield (9.52t/ha) followed by HRI-119 (8.60t/ha). Variety IR-36 recorded lowest grain yield . VRH -704 was on Par with HRi-119 in terms of grain yield varieties and hybrids have not show any significant difference regarding number of panicles /m2 HRI cultures were on par with each other for panicle weight and IR-36 recorded the lowest panicle weight . Among the nutrient levels control , N90+P40 + K50kg/ha and N90 + P80 + k50 recorded significantly lower grain yields compared to other treatments . Maximum grain yield was recorded by application of N150 + P80 + K50/ha followed by N120 + P80 + K50 kg/ha which were on par with other higher dose of NPK.

RICE VARIETIES FOR RAINFED UPLAND

In general , the productivity of rainfed upland rice is low because of various problems Lack of soil moisture , low yielding varities , stand establishment, investment capacity o farmers, etc. are major constraints to increasing the rice productivity

During kharif 2000, attempts were made to identify effecient early duration rice varietie under three agronomic management practices at Arundhutinagar.

Agnonomic packge of practices :

M1-Farmers practice broadcasting 100 kg seed/ha, fertilizer and weed control as practide by local farmers (40 :20:20 kg NPK/ha + 2 hand weeding)

M2-Line sowing of seed 60 kg seed /ha recommended dose of fertilizer and hertricic application. (N:P:K: 60:30:30 kg/ha + weedicide 5-6 day offer sowing)

M3-Stale seed bed (deep loughing to allow the weeds to germinate followed by shallow plughing 10-15 days after germination of seeds) + m2

variety V1- Vandana
V2- Amrut
V3- Talsi
V4- Annada
V5- 16T - 9219

In the above experiment mean maximum grain yield was recorded by M2 (3.68t/ha) followed by M3 (3.59t/ha) and these both management practices were at par with each other while M1 recorded significantly the lowest grain yield (2.52 t/ha). The percent increase in grain yield was of 32. 95 and 30-40 in M2 and M3 over the mean grain yield of M1. Averaged over management practices, variety Amrut recorded maximum grain yield (3.78t/ha) which was significantly superior over all the varieties . The next best variety vandana produced significantly higher grain yield of Tulsi , Annada, IET-9219 while differences among Tulsi (3.03t/ha) Annada (3.04t/ha) and IET -9219 (2.96 t/ha) were non significant .

NUTRIENT USE EFFICIENCY AND RESPONSE OF N AND K ON RICE HYBRIDS

Efforts were made to study the "P' requirement , interaction effects of N and P and nutrient use efficiency for hybrids under constant 'K' level . Results indicated that the increased level of P application decreases the nutrient response under moderate levels of N (90-120 kg N/ha) while the response at higher of N (150kg/ha) is nearly constant . However nitrogen and K requirement for hybrid rice is somewhat different from the conventional varieties .

It is suggested that balanced nutrition of N and K at the late growth stage is supposed to improve the development of spikelets and the translocation of assimilates from source to sink . In order to study the k requirement of hybrids trials were initiated since 2000 kharif which is still continuing . The results of 2000 kharif reveals that the interaction effects on grain yield between varieties and nutrient combinations indicate that PHB-71 under T10 (N150 +P60 + k80) gave significantly maximum grain yield of 10.22 t/ha as against rest of cultivars at same treatment or different combinations . All the nutrient conbination of Hybrids (T2 to T10) recorded significantly higher grain yields over local check at corrosponding nutrient combinations . Mean over the hybrids the nutrient combination T10 (N150 + P60 + K80) gave significantly higher grain yield (8.12 t/ha) over rest of treatments . However higher Nutrient

response was obtained with T7 (n120 = P60 = K80) followed by T9 (n150 + P-60 + K40) and T10 (N150 + P60 + K80)

The trend of the trial result of kharif 2001 is also in confirmot with the data of 2000 kharif . Here in the mean grain yield of 6.94 t/ha was recorded even after crop submeagence at late tillering stage and damage due to BLB . In this adverse condition also Hybrid KRH-2 and PHB-71 gave significant higher grain yield of 7.61 and 7.59 t/ha than local check IET-9219 which gave only 5.62 t/ha. Mean over the cultivars, the nutrient combination T10 (N150 + P60 + K800) gave significantly higher grain yield of 8.80 t/ha which was followed by T9 (N150 + P60 + K40). Both T10 and T 9 found to be significantly supeaior to rest of the treatments . K response was prominent as K application increased grain yield as compared to ko level at all the levels of 'N'.

Alike kharif of 2000 similar trial was also conducted during Rabi 2000-2001 with different levels of N (90,120,150 kg/ha) and potassium (0,40,80kg /ha) under uniforms level of phosphorous (60kg/ha).

The result shows , nutrient levels , hybrids and their interaction effects were significant both in terms of grain yield and yield attnibutes . Among the tested hybrids PHB-71 recorded significantly higher grain yield of 8.46t/ha when compared to KRH-2 (7.66t/ha) and IET-9219 (6.57t/ha).

The nutrient levels and combinations T9(N150 +P60 +K40), T10 (N150 + P60 + K80) and T7 (N120 +P60 +K80) recorded significantly higher grain yields of 9.25, 9.17 and 9-.13 t/ha respectively and were comparable to each other . These three treatments were found to be superior over the remaining treatments . Treatments T6 (N-120 + P60 + K40) and T4 (N90 + P60 + K80) were comparable to each other with 8.59 and 8.08 t/ha respectively and were superior to T8 , T2, T5 and T1 . Interaction effects of hybrids and nutrients found to be significant both in terms of grain yield and yield attributes . Hybrid KRH-2 recorded maximum grain yield under T9 (N150 + P60 + K40) , T10 (N150 + P60 + K80) followed by PHB -71 at the same nutrient combinations . The nutrient response was higher (17.8 kg grain /kg nutrient) with treatment T-9 (N150 + P60 + K40 /ha)

CULTURAL MANAGEMENT PRACTICES FOR ENHANCED GRAIN YIELD OF RAINFED UPLAND RICE.

The breaking of yield barier of rice under upland rainfed ecosystem is an immediate in

overall food grain production of Eastern India in general and Tripura in particular . Aiming on that experiment on cultural management of rainfed upland rice cultivation has been initiated in 2001 and was also repeated in 2002 . The treatment details of these trials are :

Treatment	Details.
T1 –	Farmers practice of Broadcasting (100kg seed /ha + 20 : 10 : 100 NPk kg /ha + 2 hand weeding .
T2 –	Improved practice of cultivation (Sowing @ 60 kg seed/ha in lines + 60 :30:30 NPKkg/ha + weedicide 5-6 days after sowing.
T3 –	Line sowing @ 60kg seed/ha + 30:15:15 N;P;K ka/ha in furrows + Fym 5t/ha as basal
T4	Line sowing + vermicompost alone @ 2.5 t/ha as broadcast.
T5	Line weeding + 50 % NPK of RFP (30:15:15 kg/ha) as basal + vermicomport @ 1.25 t/ha in furrows.
T6	Line sowing of rice + 50% NPK as basal + sowing of rice GM (2:1) in lines and turning GM at 25 DAS.
T7	Line sowing + RFD 60:30:30 NPK kg/ha + 5 + Fym/ha +2 hand weeding .
T8	Transplanting (15 x10cm) + 60:30:30 NPK kg/ha + weeding as required.

Two different varieties were utlised in both the year viz. Vandana (2001) and TRC-87-251 (2002) . Both the varieties has shown superior performance under T-8 transplanting . But performance of T8 has got no significant difference over grain yield of T2 and T7. In the year 2000 vandana shows yeild of 3.54 t/ha under transplanted (T8) and 3.2 t/ha and 2.98 t/ha under T2 and T7 respectively.

Similarly in the year 2001 TRC-87-251 (line developed by ICAR - Tripura centre) yields 3.89 t/ha under T8 and 3.34 t/ha and 3.26 t/ha under T2 and T7 respectively.

However , fintner studies are required to find out the solution for breaking of yield barier of Aus (1st Kharif) crop specially in rainged upland Ecosystem . The crop /varietal inprovement through exploitation of local genome may also give the direction towards solution .

INTERGRATED NUTRIENT MANAGEMENT (INM) IN RICE BASED

Degradation of resources like soil and water , declining use efficiency of purchased inputs and dwindling profit margin to the growers prompted the researchers to advocate Development of ecologically and economically viable cropping systems. Balanced and efficient fertilizer application is essential to compensate for the increased yields and greater

removal of soil nutrients . Use of all other resources of plant Nutrients to complement and supplement the mineral fertilizers should also be adopted under what has been termed Integrated plant Nutrition system (IPNS). It aims at sustainable crop production levels with minimum deleterious effect of chemical fertilizers on soil health and least disturbances to the rice ecosystems by the combined use of inorganic fertilizers and organic manures.

Trial on INM initiated during 2001 kharif incorporating the different doses of recommended fertilizer (0,50,100, and 150 % of RFD) with different organic sources (control , green Manure and Farm yand manure). The trial was conducted in both kharif and Rabi season of crop year 2001-2002 and 2002-2003.

During Kharif 2001 in rice -rice cropping system grain yield differences among organic sources were non-significant, however application of FYM +NPIK recorded numerically higher grain yield of 1.43 to 1.09 t/ha over without organic manune and GM + NPK. Averaged over organic sources grain yield increased significantly up to 100% Recomended NPK (80:40:40kg/ha) application (7.01 t/ha). The percent increase in grain yield in 100% rec. NPK was III.78, 47.79 and 4.32 over the mean grain yield of 0,50, and 150% of Rec NPK respectively.

SUMMARY OF DATA GRAIN YIELD AND ANCILLARY CHARACTERS OF TRIAL ON INTEGRATED NUTRIENT MANAGEMENT ON RICE BASED CROPPING SYSTEM

TRFATMENTS		GRAIN YIELD (T/HA)	PANICLE/M2 (INWD)	PANICLE Weight (in gm)
M1	T1	3.05	247	0.90
	T2	4.01	280	1.05
	T3	6.08	339	1.31
	T4	6.24	334	1.36
M2	T1	3.40	171	0.91
	T2	5.13	316	1.18
	T3	6.70	300	1.63
	T4	5.48	296	1.63
M3	T1	3.47	244	1.03
	T2	4.91	278	1.28
	T3	8.27	336	1.79
	T4	8.43	340	1.80

CD(0.05)			
Mat same T	NS	NS	0.09
T at same M	NS	NS	0.10
Mean of organic Sources			
M1	4.84	300	1.16
M2	5.18	296	1.34
M3	6.27	300	1.48
CD (0.05)	NS	NS	0.04
CV(%)	19.46	13.13	3.48
Mean of RFD Levels			
T1	3.31	254	0.95
T2	4.68	292	1.17
T3	7.01	325	1.58
T4	6.72	323	1.60
CD(0.05)	0.82	38	0.06
CV(%)	15.27	12.92	4.33

M1- control (no manure) , M2-GM (Dhaincha) , M3- FYM 10t/ha.
T1- Control T2- 40:20:20: NPK T3- 80:40:40 NPK T4- 100 :60:60 NPK (VAR-IR-64)

The resutl of Kharif 2002 trials has also shown the similar trend.

During Rabi 2001-02 grain yield differences among organic sources were not significant . Averaged over organic sources, graded levels of recommended NPK for Rabi rice, (100:50 50 kg NPK/ha) increased grain yield linearly up to 100% recommended NPK and further increase of NPK did not enhance grain yield significantly -indicating RFD of 100:50:50 NPK kg/ha is optimum dose at this experimental site.

However further detail investigation has already been initiated to develope location specific INM in Rice -Rice, Rice vegetable, Rice-potato etc. Cropping pattern of Rice based cropping system.

EVALUATION OF RELEASED RICE HYBRIDS UNDER STANDARDIZED AGRONOMIC PACKAGE OF PRACTICES FOR GRAIN YIELD

The future gains in rice could be achieved not only from effective use of resoures, but also by introduction of new technologies like hybrid rice with recommended agronomic package of practices. To identify suitable hybrid rice varieties for Tripura for Rabi under Lowland irrigated condition, 8 hybrids were evaluated at Arundhutinagar under standard agnonmic packaged developed by DRR. The fertilizer schedule developed by DRR has been applied in this trial i.e. N:P:K; 120:60:40 kg.ha where in N was applied in 3 splits (50%) basal , 25% at Maximumj Tillering and 25% at booting stage) , full P as basal and K in 2 splits (75% Basal + 25 % at PI stage).

The eight hybrids viz, PAC-832, PA-6201,PHB-71, ADTHR-1, DRRH-1, PAC-601,KRH-2 and RH-204 were compared with IET-9219 during Rabi 2000-2001. Among the hybrids PHB-71, DRRH-1, KHR-2, PA-6201 and ADTHR-1 recorded significantly higher grain yield of 9.07,8.91,8.91, 8.40 and 8.10 t/ha than that of local check IET-9219 (5.67t/ha) and the percent grain yield increase was to the tune of 59,57,57 and 48 respectively over local check. Significantly higher panicle number was recorded with hybrids while panicle weight did not differ significantly among the cultivars. The other hybrids viz PAC-832, PAC-801 and RH-204 recorded marginally higher grain yield over (6.36 to 7.10 t/ha) local check IET-9219 (5.67t/ha). Based on the results PHB-71, DRRH-1, KRH-2, PA-6201 and ADTHR-1 were found to be suitable hybrids under N:P:K 120:60:40 kg/ha at Arundhutinagar during Rabi 200-2001.

SUMMARY OF DATA ON GRAIN YIELD AND YIELD ATTRIBUTES ON EVALUATION OF RELEASED HYBRIDS

RICE HYBRIDS	GRAIN YIELD (-/hd)		Panicle/m2No)
Panicle weight(gm)			
IET-9219	5.67	464	1.57
PAC-832	6.36	557	2.70
PA-6201	8.40	392	2.47
PHB-71	9.07	454	2.94

ADTHR-1	8.10	343	2.94
DRRH-1	8.91	569	2.49
KRH-2	8.91	408	2.30
RH-204	6.51	481	2.79
PAC-801	7.10	405	2.81
CD(0.05)	1.62	109	NS
CV(%)	12.20	14.0	20.50

MANAGEMENT OF NITROGEN AND IRRIGATION WATER FOR HYBRID RICE

Water is vital for life . The per capita availability of fresh water is decreasing in most parts of the world due to population growth and industrialization . Irrigated agriculture especially rice consumers a large share of the available water in India . It is essential to reduce to irrigation water requirement by adopting suitable methods of irrigation schedules to rice .

Efficient use of water and fertilizer especially Nitrogen fertilizer is key solution to problems concerned with high production, minimal pollution and energy couservation. The biggest constriant in nitrogen management in rice is the low fertilizer use efficiency pend. The yield data of 2000-2001 Rabi results indicates that the time and methods of N application treatments influenced the grain yield significantly . Averaged over three irrigation schedules , maximum grain yield (6.99t/ha) was recorded under T5 recieving leaf colour chart (LCC) based N application which was significantly superior to rest of the treatments (4.51-6.52t/ha). N application in 2 splits (T1) recorded significantly the lowest grain yield 4.51t/ha indicating the superiority of LCC Based N management over blanket recommended practice . Irrigation schedule did not influence the yield indicating the substantial saving of water due to cyclic submergence as conpared to continuous submergence . The crop in general was disease effected at grain filling stage. Treatment details of the trial are as follows.

Irrigation schedule : IS_1- Continuous submergence
IS_2- Cyclic submergence.
IS_3- Continuous submergence with mid season Draindge.

Time and method of 'N' Application

T_1- N in 2 split ($^1/_2$ basal + $^1/_2$ PI)
T_2 - Nin 3 splits ($^1/_2$ basal + 1/4 at PI +1/4 at booting stage.
T_3- Nin 4 splits (1/4 basal + 1/4 MT + 1/4 PI + 1/4 booting)

T_4- Nin 3 splits as T_2 +FYM 10 +/ha.

T_5- Leaf colour chart based N application

Rice Hybrid-Phb-71

Similar trial was also conducted during Rabi 200-2002 with miner re-scheduling of Irrigation treatment . The treatment continous submengence with midseason drainage has been ommited.

In this trial PHB -71recorded maximum grain yield 10.11t/ha in support of better management practices and congenial environment for better growth . Grain yield were not influenced by irrigation schedules while method of 'N' application and interaction effects were found significant. The mean grain yield was significantly higher (12.14t/ha) with T5 (LCC Based N application) over all treatment . LCC based N application under cyclic submengence recorded significantly the highest grain yield of 12.76 t/ha followed by same treatment under continuous submergence indicating continous submergence is not required for PHB-71 hybrid.

Moreover the total 'N' requirement under LCC (leaf colour chart) based N application treatment stands to 80 kg N/ha which is 120kgN/ha for other treatment . The minimisation of 'N' requirement is same in both the year . However further investigation on LCC (leaft colour chart) for both HYV and Hybrid are to be made to standardise location x vaniety /hybrid specific LCC value for better 'N' use efficiency.

NITROGEN VARIETY TRIALS

This trial was conducted to study the growth , grain yield and N-use efficiency of two selected AVT-2rice cultures (IET-8883 and IET-8886) along with IR-64 and IET-9219 under transplanted condition and three graded levels of Nitrogen during Rabi-2001-02.

In this trial the grain yield was not influenced by graded levels of Nitrogen and test varieties . However , IR-64 recorded numerically higher grain yield (6.87t/ha) followed by IET-8883-(6.71t/ha) with an average mean N response of 15.7 and 19.4 kg grain /kg N, respectively.

PRODUCTION FACTOR	EXISTING PRACTICES	IMPROVED PRACTICES	REMARKS
			Seed rate.
Plant population	Normally, seed rate and seedlings /m2 are adequate. However,the seeds are usually broad-cast sown and more number of seedlings/hill (8-10)with fewer hills/m2 (20-25) are transplanted.Therefore,the ultimate crop stand is generally poor.	Optimum Crop stand using 400-600 seeds/m2 in direct-sown rice and 100-150 seedling /m2 @ 3-4 seedlings in 30-35 hill/m2 in transplanted rice.	Non-significant interaction between plant population and N-fertilization showed that the two factors worked independently and an optimum rateofbothwas essential for improving productivity.This suggests that inadequate initial crop stand due to low seed rate,poor germination and seedling mortality can't be improved by using higher dose of N under flood prone lowland conditions.
Weed control	Use of herbicides for weed control in low land rice is meager. Manual weeding is rarely done or carried out very late in the season due to other pressing field operations, by which time the weeds have already overtaken the crop and eaten away the N applied early in the season.	Application of herbicide like Butachlor and Thiobecaab @ 2kg /ha within a week of sowing in moist soil for controlling weeds, ensuraing great availability and thereby efficient utilisation of basally-applied N by the crop plants.	Herbicide application resulted in complete climination of weeds during early stages and accumulation of water after about one month coupled with development of adequate canopy cover checked growth of late flushes of weeds. Accordingly, the basal as well as top dressed N was efficiently utilised by the crop plants due to weed free condition throughout the crop

PRODUCTION FACTOR	EXISTING PRACTICES	IMPROVED PRACTICES	REMARKS
Age of Seedling	Young seedling of 30-40 days raised without fertilizer application are used for transplanting	Older Seedling of 45-60 days raised with fertilizer application in the nursery seed -bed for better establishment in the excess water regime.	Transplanting seedling of older age upto 60 days caused no adverse effect on the performance of long duration photosensitive rice varieties. The yield was higher with aged and fertilized seedlings compared with young unfertilized seedling under flash flood conditions.
Mixed Cropping	Mixed cropping of rice varieties is practised in some low lying water logged areas of Assam, Tamil Nadu, Kerala and Bangladesh.	Mixed cropping of an early variety like Banaprabha and conventional late variety-Jaya at 15 cm row spacing. Basal application of 60 kg N/ha was adequate for this system.	An yield advantage of about 0.5 t/ha was obtained in the mixed cropping system, which could be beneficial to the small and marginal farmers in the low Land areas.
Floiage frunning	Not Practised	Foliage pruning at about 100 days at growth from tall elongating rice varieties in semi deep water condition. Nitrogen application upto 60 kg/ha for harvesting more foliage and yield improvement.	About 1 t/ha foliage drymatter was harvested without affecting the grain yield. The yield response was obtained up to a higher level of N with more pruning. A nelatively higher basal N (60 Kg/ha) gave more foliage and faster recovery of plants after pruning. The protein rich fodder can supplement the nutritionat & requirement of livestock in lowland areas.

EFFECT OF SPACING ON RICE (ORYZA SATIVA) VARIETIES OF VARIOUS DURATION UNDER RAINFED CONDITION

A field experiment was conducted at Arundhutinagar during 1998 and 1999 Kharif season to standardize the planting density of rice varieties of various duration groups . The treatments comprising 3 spacings (10cmx10cm, 15cm x 10cm and 20cm x10 cm) and 4 varieties of various duration vandana (85-90 days) Tulasi (100-105), saryasree (120-125) vijay mandya (130-135). The fertilizer dose was 60:30:30 kg NPK/ha N was applied at transplanting 25% as basal 30 DAT (50%) and panicle initition stage (25%). Full P and K as basal.

Varietal variation was significant in yield attributes and yield of kharif rice . A significantly higher grain yield was recoreded with sasyasree . This could be attributed to higher number of panicles/m2 panicle length, panicle weight , 1000 grain weight and grains /panicle.

yield attributes such as effective tillers /hill , Panicles /M^2 and grains /panicle and grain and stnaw yields were significantly influenced by the differecnt plant sapcings . Effective tillers /hill increased significantly with wider spacing , while panicle /m2 decreased with wider spacing closer spacing 10 x 10 cm recorded significantly lower number of grains/ panicle than the other two wider spacings. The yield attributes such as panicle length, panicle weight and 1000- grain weight were not influenced by spacing.

Significantly higher grain yield was recorded with 10 x10 cm spacing than the other two spacing . there was no significant difference between 15 x10cm and 20x10cm spacing in grain yield . The higher grain yield with closer spacing was owing to more panicles/m2 closer spacing 10cm x 10cm also recorded significantly higher straw yield than other wider spacings.

Interaction effect of varieties and spacing was found significant on grain yield . Closer planting of short -duration varieties vandana and Tulashi at 10 x 10cm spacing gave the best result . But in case of other 2 medium duration varities , sasyasree and vijay Mandya , there was no significant difference between 10cm x 10cm spacing and 15 x 10cm spacing . Spacing of 20cm x 10cm always gave lower yield for all duration varieties.

Thus it may be concluded that the short duration varieties upto 100 days tranplanted at 10 x 10cm spacing and varieties upto 135 days duration transplanted at 15cm x 10cm spacing recorded the maximum grain yield.

apparent N recovery was recorded with neemcake-coated urea, followed by neem oil cmulsion -coated urea irrespective of concentrations.

EFFECT OF AZOSPIRILLUM AT DIFFERENT LEVELS OF NITROGEN ON YIELD OF RAINFED TRANSPLANTED RICE (ORYZA SATIVA)

The production potential of rice depends on the increased use of fertilizer. Integration of inorganic nitrogen fertilizers with bio-fertilizer reduces the demand of inorganic nitrogen and increases the nitrogen use efficriency. Presently Azospirilum, a microbial inoculant (biofertilizer) is being considered as a primary constituent of Integrated Nutrient Management system (INMS).

Azospirillum culture fixes atmospheric nitrogen and enhance rice yield. The nitrogen gains from bio-fertilizers are highly variable, depending on soil, envirnment, nature of native microbial population etc. Hence an experiment was conducted to stydy the efficacy of Azospirillum in conjunction with inorganic nitrogen on rice yield under rainfed low land Ecosystem.

The field experiment was conducted at Arundhutinagar during 1999 and 2000 to know the efficacy of Azosprillum in conjuction with the inorganic nitrogen on yield of rice transplanted under rainfed lowland ecosystem. The treatments consisted of 2 levels of Azospirillum (with out Azorpirillum (A0) and with Azospirillum (A1) and 4 levels of nitrogen (0 50% RED, 75% RFD and 100% of RFD). The trial was laid on Factorial RBD with 3 replications and variety utlized was MTU-7029.

Treatment Details :- **Azospirillum (A)**

A0-Azospirillum not applied.

A1-Azospirillum applied through root dipping. (Slurry was prepared by mixing 200gm Azospirillum in 4-5 its of water and roots of the seedlings were dipped for 20 minutes Azospirillum dipped seedling were used for transplanting.)

Nitrogen levels (N)

N0 = No Nitrogen

N1 = 50% of RFD i.e @ 40 kg N/ha
N2 = 75% of RFD i.e @ 60kg N/ha
N3 = 100% of RFD i.e @ 80kg N/ha.

RFD = Recommended Fertilizer dose i.e 80:40:40 kg NPK (ha)

Fertilizer Schedule:

N dose as per treatment in 3 splits. (v2 basal +1/4 at tillering and 1/4 at panicle initiation). P40 and K40 as basal in all the treatment combinations.

The variation in grain yield and straw yields was significant with increased level of nitrogens. Application of 100%. RFD of N recorded significantly higher grain yield than other nitrogen levels. Similarly, the staw yield was also significantly higher with 100% recommended dose of N. The increase in grain yield was mainly attributed to increased panicle/m2, grain yield /panicle, 1000 grain weight, percentage of filled grain and reduced chaffyress with increased N levels.

The grain yield of rice were significantly higher with Azospirillum (A1) treatment in compared with no Azospirillum (A0). The straw yield was also significantly higher with A_1 treatment in all the N level alike grain yield. The same trend was observed in the experiment and year. The increase in grain yield of rice owing to Azospirillum (A1) was mainly because of yield parameters. This better response of rice for Azospirillum dip was may be attributed to increased N availability through increased N fixation by the Azospirillum culture.

The interaction effect of Azospirillum and nitrogen levels on grain and straw yield was significant. The grain yield recorded with Azospirillum + no N (3,559kg/ha) was significantly higher than that of no Azospirillum + 50% recommended dose of N (3,017kg/ha) during 1999. In pooled data, the grain yield recorded with no Azospirillum (A0) + no N (No) (3,234kg/ha) and no Azospitillum (A0) + 50% N of RFD (3,216kg/ha) was at per. The grain yield recorded with A1 + 50% N of RFD (4802 kg/ha) was on par with that obtained with A0 + 75% N of RFD (4703 kg/ha).

However, the grain yield recorded with Azospirillum + 75% N of RFD (5330 kg/ha) was significantly higher than that obtained with no Azospirillum (A0) + 100 % N of RED (5146 kg/ha) in pool data on an average over 2 years, the extent of increse in grain yield with

Azospirillum treatment over no Azospirillum treatment was 20.6, 13.9, 13.3 and 6.1 % at 0,50,75 and 100% recorded dose of 'N'. The grain yield recorded with Azospirillum + 75 % recommended dose of N (4,350; 6,311 and 5530 kg/ha respectively) was on par with that of Azospirillum + 100% recommended dose of N (4,392 ; 6528 and 5460 kg/ha respectively) during 1999 , 2000 and in pooled data . As such it can be concluded that combination of Azospirillum +75% recommended dose of N would be sufficient to get higher yields of rice under rainfed lowland situations . This helps in reducing 25% recommended dose of N and thereby expenditure on nitrogen fertilizer.

STUDIES ON THE SYSTEM OF RICE INTENSIFICATION

SRI (System of rice intensification) begins with a philosophy : Rice plants are to be respected and supported as living creature that have great potential. This potential will only be realised if we provide plants with the best conditions for their growth.

The SRI has discovered and demonst rated some important methods for helping rice plants to achieve their real potential . These potential has been obseured by existing practics. The key to sucess with SRI is the early transplanting of seedlings, transplanting of the seedling within half an hour of uprooting of the seedling from nursery bed, wider spacing (25 x25cm), single seedling hill.

Another inportant features of SRI is each seedling are to be slipped sideways into the soil, very gently and close to the surface soil . this makes the shape of the transplanted seedling more like a 'L' than like a 'J'.

A major departure from usual rice planting practice-an innovation as important as transplanting tiny young seedlings is to grow rice in soil with no continuous standing water as SRI does not considered Rice as an aquatic plant . The SRI scientist clained that through adoption of this system farmers can yield 10 tons/ha and compete with hybrid.

The SRI concept has been developed by Tefy saina a NGO of Madagasker and Cornell International Institute for Food , Agruculture and Development (CIIFAD) NewYork which are getting populanistion day by day.

On the basis of this concept we have laid down experiment at our Arundhutinagar station during Rabi Season of 1999-2000 and 2000-2001 and Kharif 2000.

Kharif and Rabi trials were laid down with split -split experimental design with the following treatment experimental.

Treatment details :

Main plot = Spacing =4 Nos.

SP1 = 25 x25 cm

SP2 = 25 x 20

SP3 = 20 x 20cm

SP4 = 15 x 10cm

Sub-plot : Age of seedling

AS1 = 15 days

AS2 = 25 days

A3 = 35 days

Sub-sub plot : No of seedling ,

NS1 = 1 seedling/hill

NS2 = 2 Seedling/hill

NS3 = 4 Seedling/hill

Fertilizer Schedule

80:40:40 kg N;P;K/ha

(N = 3 split 1/2 basal + 1/4 mt + 1/4 PI)

P and K Basal.

In both the year and season crop shows responses in various direction . primarily the result indicates better growth in the treatments combination of single seedling , early age seedling and wider spacing . Early age seedling has shown better crop establishment trend in all the treatment combinations . The interaction between wider spacing and number of seedling shows better yield trend in the combination of less number of seedling.

However further detailed investigation is required on SRI under Tripura condition . In

India Tamil Nadu Agricultural University has also started work on the refinement of SRI concept to be suited to Indian condition in general and TamiNadu in particular. Accordingly from this crop year onwards we have re-initiated trials on refinement of SRI to be suited to Tripura condition.

STUDIES ON THE YIELD PERFORMANCE OF RICE HYBRID CULTIVAR AND INTENSTIY OF SPIKELET FERTILITY (GRAIN FILLING AND CHAFFINESS)

Though hybrid rice is giving higher yield under good crop environment and mangement still it pases some problems with special reference to grain filling. The problem of chaffyness is being reported by most of the hybrid rice cultivators.

To evaluate the proper management practices on the problem of chaffyness trial was laid down under split plot Design at Arundhutinagar during Rabi 2001-2002 Kharif 2002 and Rabi 2002-2003. The treatment detalis of the trials are as follows:-

Mainplot = Hybrids :-		Rabi 2001 - 2002	Kharif 2002	Rabi 2002 - 2003
H1	=	PHB-71	PHB-71	PHB-71
H2	=	PAC-801	RH-204	SURUCHI
H3	=	PAC-832	PAC-801	RH-204
H4	=	PA-6201	PAC-832	DRRH-1

SUBPOT Treatness : Chemicals for spikelet Fertility mangement.

C0 = No chemical
C1 = Urea@0.5kg/ha foliar spray before full heading.
C2 = Potassium di-hydrogen phoshate @ 3.0 kg/ha before full heading Foliar spray.
C3 = Urea + Potassium di-hydrogen phosphate.
C4 = Potassium Nitrate 2% foliar spray before full headling.

The experimental result of 3 season data has been analysed . All the treatment has shown significant yield advantage over control (no chemical application) under fertilizer dose of 100:50:50 NPK kg/ha for both the season. Fertilizer was applied N-3 split, P-basal, K -2 split for all the hybrids and season.

Averaged data of the grain yield of treatment of the all chemicals has been analysed several indication has been recorded but no significant difference was found among the chemical applications. In the experiment of kharif -2002 urea +patassium di-hydrogen phosphate shown numerically higher yield in companison to other treatments in the Hybrid rice.

In the Rabi-2001-2002 the treatment of only urea 0.5% shown the highest yield and Rabi-2002-2003 shows highest yield in the treatment of KNo_3.

Among the varieties the PHB-71 shows stable trend in the spikelet fertility in companison to all other Hybrids. The DRRH-1 PAC-832 and PA-6201 shows better stability than RH-204, SURUCHI and PAC-801 on spikelet Fertility.

However we intend to undergo further studies on these aspect with special reference to Nitrogen fertilizers and primary and secondary tillers , and spikelet of upper and lower half of the panicle.

INFLUENCE OF SOIL MOISTURE REGIMES AND FERTILIZER ON WINTER GROUNDNUT PRODUCTIVITY

Groundnut (Arachis hypoged L) is the important oilseed crop, meeting the needs of vegetable fat, protein, cattle feed and concentrated organic manure. Irrigation is a limitation to upland ecosystem of Tripura. As such to evaluate the cultivation aspects of Groundnut under residual moisture an experiment was conducted during 2002 at Arundhutinagar station.

The experiment was laid in split plot designs with 21 treatment combination replicated thrice . The treatments included 7 dates of sowing Sept. 30th , Oct 15th , Oct. 30th, Nov. 15th, Nov. 30th, Dec 15th, Dec. 30th, as main plot and 3 fertilizer level (NPK kg/ha 20:40:20 and 40:60:40 and control) the variety AK-12-24 was sown for the trial . In the trial all other package of practices were folllowed and prophylactic measunes were taken against sucking pests.

The summary of data indicates that October 30th and Nov. 15th gives higher yield . The cessation of rain during the 1st fortright of Oct. helps to provide supply the minimum water requirment to the crop sown during Oct. 30th and Nov.15 which may have resulted to better

N1 = 60 kg/ha
N2 = 80 kg/ha
N3 = 100 kg/ha
N4 = 120 kg/ha

Other Fertilizer.

P- 40 Kg/ha = 40 kg/ha

The result indicates that plant height increased significantly with the application of FYM at 20 tonnes/ha . The application of FYM at 10, 20 and 30 tonres/ha enhanced 6.2, 10.0, 11.2 and 4.8, 7.8 and 8.4 percent plant height over the control during 1996-97 and 1997-98 respectively . Application of 120 kg N/ha significantly improved the plant height, number of tillers

Effective tillers and grains/spike increased significantly with the sucessive increment in FYM up to 20 tonnes/ha . This dose enhanced the number of effective tillers and grains/ spike 26.7 and 4.1 percent during 1996-97 and 17.9 and 4.2 percent during 1997-98 over the untreated plots . It may be owing to beneficial effect of FYM on crop growth and various physiological parameters, which effected yield attributing characters positively

The grain, Straw and biological yields were significantly higher with the application of FYM at 20 and 30 tonnes/ha over FYM at 0 and 10 t/ha respectively . Addition of FYM 20 toun/ha enhanced the grain yield 31.4, 22.9 and 27.3% over the control and 9.4, 7.2 % over FYM 10 tonners/ha in 1996-97 and 1997-1998 respectively.

Interaction effect of FYM and N levels on grain yield of wheat was found significant during both years . The grain yield of wheat was significantly higher at 120 kg N/ha with FYM 10 tones/ha compared with 100kg N/ha with FYM 20 ton/ha. The above trend was similar in both the years including pooled data. This can be attributed to the beneficial effect of FYM in combination with N Fertilizer on growth and yield -attrubuting parameters which Ultimately resulted in higher grain yield of wheat. Thus neither the use of organic manure alone nor the sole use of chemical fertilizer may be adequate in maintaining sustained higher productivity under modern farming owing to this inherent limitations. Integration of FYM 10 tonnes/ha and 120kg N/ha or FYM 20t/ha along with 100kg N/ha was found to be effective in maintaining sustained productivity.

PERFORMANCE OF WHEAT VARIETIES UNDER IRRIGATED VERY LATE SOWN CONDITION IN TRIPURA

In Tripura generally wheat is sown after harvest of kharif rice. As such, land, sometimes is not vaccated during its normal sowing time which extends 1st fortnight of November to 2nd fortnight of December. On the other hand, delay in sowing time results in depletion of residual moisture. As such it necessitated to evaluate the performance of wheat varieties under limited irrigation in late sown condition.

Accordingly a field experiment was conducted at Medium land of Arundhutinagar research station to identify wheat varities suitable for very late sown condition. The treatment consisting of two date of sowning (December 15th and January 1st) as main plot and nine wheat varities (Viz :PBW-343, K-9533 HUW 489, HP-1811, HUW-234, HP 1633, HP- 1744 and sonalika) in subplots in a split plot design replicated thrice.

A dose of 100kg N/ha in the form of urea 50 kg p_2o_5/ha in the form of SSp and 50 kg K_20 in the form of Mop was applied. K and P were applied basally and N was splitted to be applied as basal (50%), CRI (25%) and at heading stage (25%). For uniform germination a pre-sowing irrigation was given. Irrigation upto field capacity was done at crown root initiation . The yield data shows that earhead /m2 and grain yield were significantly influenced by date of sowing . Grain yield decreased significantly in 1st january sowing as compared to December 15th sowing. Reduction in grain yield was due to the significantly lower number of earhead /m2 in delayed sowing . Delayed sowing has also reduced the crop duration in wheat.

SUMMARY OF DATA ON PLANT HEIGHT , YIELD ATRRIBUTES AND YIELD OF WHEAT VARITIES AS INFLUENCED BY DATES OF SOWING

Treatment	Plant height (cm)	Ear-head/m2	Grains/ Spike	Days to maturily	Grains yield (N/ha)
Sowing Date					
December 15th	69.9	190.10	24.90	115	15.0
January 1st	69.0	119.60	23.60	108	10.1
CD (P=0.05)	NS	46.1	NS	---	4.9

Variety	Plant Height	Earbead (/m2)	Grains /spike	Days to maturity	Grain yield (N/ha)	1000 grain
PBW 343	74.3	141.6	25.8	111	14.50	42.8
K 9533	66.0	172.2	25.7	111	9.90	40.9
HUW 489	64.6	208.1	31.1	111	14.90	37.7
HP 1811	73.2	152.7	19.8	111	13.90	45.4
HUW 234	70.0	147.6	25.0	111	13.90	45.4
HP 1633	74.5	140.8	23.9	111	12.60	47.4
HP1744	62.4	143.3	17.8	111	9.0	41.8
NW1014	74.2	160.2	27.4	111	13.20	41.3
SONALIKA	66.3	122.3	21.9	111	11.10	46.8
(CD P= 0.05) 4.2	25.3	5.3			3.80	

Varieties differed markedly in respect of all the yield attributing charachters and grain yield . The highest grain yield of 14.9 q/ha was recorded by HUW 489 which was significantly higher than sonalika, K 9533 and HP 1744. mariginal variation in grain yield was observed in PBW 343, HUW 489, HP 1811, HUM 1633 and NW 1014 which were statisticaly at par. The variety HUW 489 also recorded the highest grain production rate (13.4kg/day/ha). Further, it produced the lowest test weight reflecting the fineness of the variety.

It can be inferred that HUW 489 is the most promising wheat variety under late sown , irrigated condition in valleys of Tripura and January is too late to sow the wheat under any circumustances in Tripura.

EFFECT OF SOWING DATE AND SPACING ON COMPOSITE MAIZE (ZEA MAYS) IN UPLAND RAINFED ECOSYSTEM

Maize is the second important food crop next to rice of the hill areas of Tripura . It is generally grown as a pure crop or mixed with other crops in the Jhum lands with the onset of monsoon (march to may) . Among the various agronomic factor , time of sowing is the most inportant one . Identification of optimum time of sowing for a crop ensures higher production and economic returns . The experiment shows that planting /sowing time is the most critical factor for maize productivity and among all constriants the yield reduction was highest due to delayed sowing .

Optimum plant population is also another important factor in increasing the productivity. The present experiment was conducted with a wiew to find out optimum sowing time and spacing of maize under rainfed upland condition (Tilla table).

The field experiment was conducted with composite maize Vijoy in rainfed upland (Tilla Table) during Kharif 1996, 1997, and 1998 at Research Cum Demo Farm , Arundhuti nagar . The treatments comprised of five sowing dates (15th March, 15th April , 15th May , 15th June and 15th July) and three spacing (55cm x 20cm, 65cm x 25 cm and 75 cm x 20 cm) and the experiment was conducted in randomised Block Design (Factorial) with 3 replications. fertilizer was applied uniformly @ 60:40:40 kg NPK/ha . The whole of P_2O5 and K_2O and half of N was applied as basal and the remaining N was top dressed in two equal dose at knee high and tassel initiation stage .

SUMMARY OF DATA OF THE EXPERIMENT ON DATE OF SOWING AND SPACING ON PLANT HEIGHT , COB WEIGHT , GRAIN YIELD OF MAIZE.

Treatment	Plant height (cm)				Cob wight (q/ha)				Grain yield (q/ha)			
	1996	1997	1998	Mean	1996	1997	1998	Mean	1996	1997	1998	Mean
SOWING DATE												
15th March	198	191	199	196	447	28.8	12.3	28.5	20.8	16.1	8.0	15.1
15th April	197	189	187	191	49.6	28.8	38.5	37.6	28.7	14.1	24.1	22.8
15th May	216	215	220	217	65.4	35.1	42.4	47.6	35.8	17.4	27.2	26.8
15th June	266	175	226	222	18.8	10.9	23.3	17.6	12.9	6.3	14.6	11.3
15th July	221	165	190	192	6.5	3.1	9.7	6.4	3.5	2.4	5.5	3.8
CD (P=0.05)	19	21	23	20	9.2	6.9	6.0	7.3	6.3	3.7	3.7	4.3
SPACING												
55cm x 20 cm	221	191	205	206	38.2	20.1	27.0	28.4	19.5	11.3	17.5	16.1
65cm x 20 cm	209	189	208	202	38.9	21.4	24.4	28.2	21.5	11.9	14.6	16.0
75cm x 20 cm	229	181	200	203	33.9	20.0	24.2	26.0	20.1	10.5	15.6	15.9
CD (P = 0.05)	14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Significant variations were observed in plant height, Cob weight and grain in all the three years of experimentation and when averged over three years. May and June sown crops recorded compartively taller plants over other sowing dates. Significantly higher grain yield was recorded in 15 may sown crop followed by 15th April and 15th March. The increased

grain yield was closely associated with the Cob weight. May sown crop recorded 138 and 608% higher yield over June and July sowings. yield increased linearly from 15th March to 15th May sown crop over June and July sowing and thereafter declined sharply from 15th june onwards. Comparatively higher rainfall and temperature faced by June and July sown crops might have affected the tasseling and proper pollinations resulting in poor grain formation in delayed sowing beyond 15th May. Net return and benifit cost ratio was highest in 15th May sown crops followed by 15th April and 15th March . Beyond 15th May sowing the net return become negative.

Different spacings could not bring out any significant variation on any of the charachter studied expect plant height in 1996. However highest mean grain yield was recorded at closer spacing with optimum 55cm x 20 cm with highest net return and benifit cost ratio.

EVALUATION OF DIFFERENT COTTON CULTIVAR AND FERTILIZER RESPONSES UNDER UPLAND RAINFED (TLLA TABLE) CONDITION.

Presently the cotton is generally grown as a mixed crop under shiffing Agriculture system. The history of Tripura Agriculture reveals that cotton had role of the value added crop in the preseventies decade. The Bio-Diversity record shows that it has natural advantage of growing under Agro-climatic condition of Tripura , Considering all the above we have tried to evaluate the performance of present day cultivars under application of chemical fertilizer in a tilla tables (uplands) of Tripura under rainfed condition.

Accordingly experiment were laid down at Arundhutinagar during Kharif 1999 and 2000. The experiment was laid on factorial RBD with the factors variety and Fertilizer schedule. We have taken 3 NPK fertilizer schedule (NPK 60:30:30 and 80:40:40 kg/ha and control and 5 varieties (MCU-5-VT, ANjali, Sumangala, LRA-5166, local Jhum cotton). The cotton was sown at the spacing of 75cm x30cm during the last week of may in 1999 and 1st week of June in the year 2000. half of the dose of N and Full quantity of P and K were applied at the time of sowing. Remaining Half of N was applied at squane formation stage. Plant pratection measures were adopted as per the recommendation .

Yield data obtained from two years study indicate that plant height, leaf area per plant, leaf area index, boles /plant, weight per ball, lint per boll and seed cotton yield increased with each sucessive increment of Fertilizer schedule (NPK : 00 : 60 : 30 : 30 - 80 : 40 : 40)

irrespective of varieties . Maximum response were observed in the fertilizer schedule 80:40:40 kg NPK/ha . The significant difference was observed in the seed cotton yield , number of bolls per plant and weight per boll at 80 : 40 : 40 kg NPK/ha and 60 : 30 : 30 kg NPK/ha over control. Averaged over the varieties LRA-5166, Anjali, Sumangala recorded significant yield difference over MCU-5-VT and local Jhum cotton . Though significantly there was no difference among the LRA 5166 (31.5 q/ha) Anjali (30.29 q/ha) sumangala (29.5 q/ha) but numerically LRA 5166 yielded highest seed cotton in both the year of the experiment Increased seed cotton yield was possible due to development of yield attributing charachters at higher Fertilizer dose /schedule.

YIELD PERFORMANCE OF SESAME CULTIVAR UNDER DIFFERENT DATE OF SOWING AND FERTILIZER LEVEL UNDER RAINFED TILLA TABLE

Considering the very meagre productivity of upland rice during 1st Kharif we have studied the yield performance of seasamum under upland rainfed tilla table for better economic return as well as production was laid down at Arundhutinagar during 2001 and 2002 kharif under split plot design with the date of sowing as main plot and level of fertilizer as sib plot . The treatment conbination were replicated thrice and variety B-67 were used in both the year.

Treatment details are :

Main plot - Date of Sowing

D1- 1st May
D2- 15th May
D3- 1st May
D4- 15th June

Sub plot : Level of Fertilizer

F0 = N : P : K kg/ha
0 : 0 : 0
F1 = 20 : 10 :10
F2 = 40 : 20 : 20
F3 = 60 : 30 :30

The yield of the D1 (1st May) give highest yield (5.7 and 5.92 q/ha) during 2001 and 2002 respectively and D2 (15th May) gives second highest yield in both the year (5.62 and

5.96 q/ha) 2oo1 and 2002 respectively. The yield of D1 (1st May) and D2 (15th May) were significantly higher over yield of 1st June and 15th June Sowing in all the fertility level except control (F0).

The avaraged yield of level of fertilizer indicates that the irrement of fertilizer level has added to yield of sesamum under the tille Top soil condition. The fertilzer level F2 (40 : 20 20 NPK kg/ha and F3 (60 : 30 : 30 NPK kg/ha) recorded significantly higher yield over F0 (control and F1 (20 : 10: 10 NPK kg/ha) . But numerically F_3 recorded highest yield . The avobe trend was observed in both the year . Further investigation on this is going on

STUDIES ON THE INFLUENCE OF DATES OF SOWING ON THE GROWTH AND YIELD OF SESAMUM CULTIVAR 'KRISHNA' UNDER RAINFED TILLA LAND

The performance of the promising variety of sesamum - KRISHNA was evaluated under rainfed tilla land . The experiment was conducted at Arundhutinagar to study the influence of different Dates of sowng (six dates) on the yield of sesamum var Krishna. The trial was laid on RBD with 4 replication during kharif 1998 . The fertilizer schedule for the trial was 40 : 20 :20 NPK kg/ha. The detaile information on biometric charachters and yield per hetare is given herewith .

Summary of datas of the experiment on influence of dates of sowing and yield performane fo sesamum caltivar krishna.

Treatment Dates of sowing	Plant height (in mt.)	No of branches per plant	Yield Q/ha
D1- 15th May	2.53 mt.	22	725
D2 - 1st June	1.55 mt.	17	542
D3 - 15th Jun	1.47 mt	14	475
D4 - 1st July	1.25 mt	11	405
D5 - 15 July	0.95 mt.	09	325
D6 - 1st Aug.	0.85 mt	08	285

Under 15 m May sowing the plant gives higher plant height, higher no of branches plant and highest yield as well.

STUDIES ON THE EFFECT OF INTERCROPPING IN MAIZE

Maize is a widely spaced crop and leaves much land area vacant in between two rows and plants . Now for better utilization of the land we have conducted experiment at Arundhutinagar station to evaluate the suitability of growing intercrop in a additive series over base crop maize . The crop choosen to study as intercrop on maize are moong (T44) Blackgnam (T9), Sesamum (B-67), cowpea (C-152) and rice (Heera) . The variety of maize kissan. The spacing of maize was 60 x 30cm and trial was conducted on RBD with 3 replication.

SUMMARY OF DATA

(A) Effect of intercropping on the yield of base crop Maize.

Treatment	Yield Q/ha
T1 - Maize (sole)	13.80
T2 - Maize + Moong	14.41
T3 - Maize + Blackgram (1:2)	13.00
T4 - Maize + Cowpea (simultaneas sowing)	7.47
T5 - Maize + cowpea (sownafter 30 DAS Maize 1:1)	9.35
T6 - Maize + Sesamum (1:2)	12.72
T7 - Maize + rice (1:4)	12.87
CD (0.05)	4.18

(B) Yield of Intercrops grown in base crop Maize

Crop	Yield/Sde (Q/ha)	Yield Intercrop (Q/ha)
Moong	8.00	1.41
Blackgram	7.50	1.61
Sesamum	6.00	1.25
Cowpea	8.00	1.06
Cowpea defered sown	8.00	1.09
Rice	12.50	1.00

Yield of rice was lowest which showed high percentage of sterility due to soil moisture stress and Nutritional disorder.

(C) Evaliation of the Intercropping system

Treatments	Land Equivalent Ratio
T1 - Sole maize	-----
T2 - Maize + Moong (1:2)	1.22
T3 - Maize + Blackgram (1:2)	1.15
T4 - Maize + cowpea (1:1) (Simultaneas)	0.67
T5 - Maize + cowpen (1:1) (sown after 30 DAS)	0.81
T6 - Maize + Sesamum (1:2)	1.13
T7 - Maize + rice	1.01

In the intercropping system moong, Blackgram and sesame have shown the compatibility and more efficient than cowpea on rice as intercrops in maize.

YIELD PERFORMANCE OF SOYABEAN AND RESPONSE TO DIFF FERTILIZER LEVEL UNDER RAINFED UPLAND (TLLA TABLE) OF TRIPURA.

Soyabean is a short duration crop having worldwide adaptation. The adaptation and yield performance have been evaluated under tilla table (upland) soils. of Tripura in rainfed condition during 1998 and 1999 kharif. The experiment was conducted at Arundhutinagar in over exposed tilla soils. The trial was laid on RBD with 6 levels of fertilizer and replicated thrice. The seed rate 100 kg/ha. The variety JS-335 witn the spacing of 30 cm

Treatment datails one

	N :	P :	K kg/ha
F1 =	0	0	0
F2 =	10 :	20 :	10
F3 =	20 :	40 :	20
F4 =	20 :	60 :	20
F5 =	30 :	60 :	30
F6 =	40 :	60 :	40

Result :

Stem borer :

Based on mean infestation at vegetative Stage, fipronil granules (7.11 % D H) was on par with standard check Carbofuran granules (7.47 % D H). Among spray formulations, amitraz (9.32 % D H) and thiocyclam hydrogen oxalate (9.81% DH) were on par with standard check chloropyriphos (8.47 %D H) while other insedticides viz. ,deltamethrin (10.00 % D H), methofenozide (10.80 % D H), lambda cyhalothrin (11.10 % D H) and thiomethoxam (12.00 % D H) were slightly inferior. Untreated control registered 16.80 % D H.

Based on mean intestation at heading stage, fipronil granules (12.34 % WE) was on par with standard check carbofuran granules (11.58% WE). Among spray formulations thiocyclam hydrogen oxalate (12.07%WE) and amitraz (13.34 % WE) were on par with Standard check chloropyriphos (13.44 % WE). Other spray formulations viz., Lambda cyhalothrin (15.67 % WE), deltamethrin (16.83 % WE) methofenozide (18.54 % WE), thiomethoxam (19.99 % WE) were inferior to standard check. Untreated control recorded (26.95 % WE)

Leaf folder :

Leaf folder damage was low. Fipronil granules (1.7 ADL/10h) exhibited efficacy similar to carbofuran granules (2.0 ADL/10h). All the spray formulations, exerted similar efficacy against leaf folder (2.2 ADL/10g to 4.2 ADL /10h) as compared to standard check chloropyriphos (4.1 ADL/10h) but Superior to untreated control (6.6 ADL/10h).

Rice Hispa :

Rice Hispa damage was low.All the insedticides (0.7 ADL/10h to 2.2 ADL/10h) were moderately effective as campared to untreated control (12.2 ADL/10h)

Gandhi bug :

All the insecticides were moderately effective against gundhi bug (1.5 AN /10h to 3.7 AN/10h) as compared to untreated control (15.2 AN/10h)

Grain yield :

Fipronil granules increased grain yield by 30.25 % over untreated control as compared to 21.70% increase in carbofuran granules applied plots. Among sprays methofenozide

17.32% increase was comparable with standard check chloropyriphos 19.80% increase. Other insecticides registerd an increase of 4.71% to 13.22% over untreated control.

The overall results on insect infestation and grain yield revealed that fipronil granaules (75g a.i/ha) was on par with Carbofuran granules (1000g a.i/ha). Spray formulation of Methofenozide (100g a.i/ha) was on par with standard check chloropyriphos. (500g a.i/ha). Other insecticides were inferior to chloropyriphos but effective as compared to Untreated control.

PESTICIDE COMPATIBILITY TRIAL.

To check the insect as well as disease attack simultaneously in the paddy , it often becomes necessary to apply both the recommended insecticides and fungicides as a tank mix to reduce the cost of pesticide application. For these circumstances it is desirable to generate information regarding the compatibility of insecticides and fungicides based on the efficacy against insect pests and diseases under field conditions. With this objective pestcide compatibility trial has been constituted with newly recommended insecticides and fungicides.

Treatments :-

Two recommended spray formulations of insecticides viz. , ethofenprox (0.01%) and cartap (0.05%) and fungicides viz. Propiconazole (0.025%) and hexaconazole (0.01%) in four possible insecticide fungicide combinations as well as untreated control formed the trial. All treatments were applied at 10, 30, 50 & 70 DAT.

table - 2 Incidence of insect and severity of diseases under different treatments in Pesticide compatibility Trial.

Pesticide	Conc. of a.i in spray fluid	Stamborer		Rice Hispa ADL/10g	Sheathblight Diseax Index)	Grain yield kg/ha	IOC
		% DH	% WE				
1) Ethofenprox	0.01%	5.0	5.5	4.3	13.8	4149	32.13
2) Cartap	0.05%	5.2	6.8	3.4	15.6	4061	29.33
3) Propiconazole	0.025%	8.9	9.4	13.7	8.2	3675	17.03
4) Hexaconozole	0.01%	7.0	10.5	14.0	5.8	3640	15.92
5) Ethofenprox 0.01% + Propiconazole	0.025%	4.5	12.6	2.9	6.2	4245	35.19
6) Ethofenprox 0.01 % + Hexaconazole	0.01%	5.6	10.2	5.1	7.4	4078	29.87

7) Cartap 0.05% + Propiconazole	0.025%	5.5	11.7	4.8	9.6	4228	34.64
8) Cartap 0.05% + Hexaconazole	0.01%	6.3	11.7	4.7	9.8	4035	28.50
9) Untreated control	-	8.5	15.4	17.4	14.8	3140	
CD(0.05)						454	
CV(%)						8.0	

Result :

Insect pest infestation :

Based on the mean incidence data ethofenprox and cartap as well as insecticide - fungicide mixtures involving these insecticides recorded relatively low damage (5.0 to 6.3 % DH) in vegetative stage as compared to 8.5% DH in untreated control. However at heading stage, ethofenprox and cartap Spray checked stemborer incidence (5.0 to 5.2% W.E.) while mixtures involving these insecticides failed to control the pest (9.4 to 12.6% DH) as compared to 15.4% WE in untreated control.

Rice hispa damage was low. However the Spraying of ethofenprox and Cartap and the combination treatments shows good degree of efficacy in controlling hispa damage (3.4 ADL/10h to 5.1 ADL/10h) in compared to 17.4 ADL/10h in untreated Contrrol.

The overall results showed that tank mixing of ethofenprox or cartap with fungicides did not hinder their efficacy to check insect pests under field condition.

Disease severity

Disease index record in sheath blight showed that the two fungicides viz. , propiconazole and hexaconazole individually and in combination with insecticides lowered the disease index with definite positive trend on compatibility between fungicides & insecticides.

Grain field:

The grain yield data showed that insecticide alone increased grain yield by 32.13 to 29.33% and fungicide alone enhanced the yield to a tune of 15.92 to 17.03 % over untreated control. The combination treatment resulted in a grain yield increase of 28.50 to 35.19% over untreated control.

The over all results on insect pest infestation, disease severity as well as grain yield revealed that two insecticides viz. , ethofenprox(0.01%) and Cartap (0.05%)as well as the two fungicides viz propiconazole (0.025%) and hexaconazole (0.01%) are compitable in the insecticide - fungicide combinations tested for control of insect pests and diseases on rice.

Nursery and Early stage pest control (NEPT) :

The main objective of this trial was to study the effect of seed treatment and nursery application of systemic insecticides on the insect pest incidence in the main field in early stages of transplanted crop. Fipronil, Thiomethoxam, and imdacloprid are systemic insecticides possessing good persistence in the plant even at low dosages(25-50g.ai/ha). To exploit this property seed treatment by immersing one kg of seed after spouting in 1 1t. of 0.5% emulsions of fipronil and thiomethoxam for three hours before sowing were include as separate treatments in this trial. Nursery drenching with imulsions of fipronil (@75 g ai/ha. of nursery) 5 days before pulling of seedling were also involved as separate treatment. In addition, combination treatments involving seed treatments and the nursery drenching with fripronil and thiomithoxam were also include as separate treatment. These were compared with a treatment involving imidacloprid seed treatment (0.05%) + nuursery drenching with imidacloprid (@ 75g ai/ha of nursery) as well as standard carbofuran granular application (& 2000g ai/ha nursery) 5 days before pulling and an untreated control. To study the yield difference due to the above treatments, the crop were protected by applying monocrotophos @ 500g ai/ha at 45 and 60 DAT uniformly in all plots including untreated control. Obserbations were recorded on stemborer and Rice hispa normally occurring on early stages of transplanted crop.

Stemborer incidence was low to moderate(2.6 to 7.7%DH) at 30 DAT 40 DAT. Based on mean infestation data seed treatment and nursery drenching with Fipronil, thimethoxam and their combination of seed treatment and nursery drenching with Fipronil, thiomethoxam and imidacloprid recorded 3.1 to 5.75% DH as compared to 2.9% DH in carbofuran treatment and 7.1%DH in untreated control.

Against Rice Hispa the insecticide treatments recorded 2 to 4.3 ADL/10 hills as compared to 1.3 ADL /10 hills in Carbofuran and 7.6 ADL/10 hills in untreated control

The combination of seed treatment and nursery drenching with Fipronil improved grain yield by 14.08% over untreated control as compared to 2.19 to 8.73% in other insec-

ticide treatments and 14.18% in Carbofuran granular application.

The over all result based on insect pest incidence and grain yield revealed that seed treatment (0.05%), Nursury drenching 100 gm ai/ha of nursery with fipronil in combination checked pest incidence in early stages of transplanting and increased grain yield similar to granular broadcast in nursery with carbofurn(2000 g ai/ha of nursery) 5 days before pulling of seeding.(table-1).

(TABLE NO:1) : Incidence of insects under different treatments of nursery and early stage pest control :

INSECTICIDE	RATE (g.ai/ha) conc.(%)	Stemborer (%of dead heart)			Rice hispa (ADL/10h) 30 DAT	Grain yield (kg/ha.)	% of grain yield over control.
		30DAT	40DAT	Mean			
1	2	3	4	5	6	7	8
1.Fipronil 5 sc (Regent 5 sc)	0.05%	3.8	4.0	3.9	3.6	5588	8.73
2. Fipronil 5sc (Regent 5sc)	100g.ai./ha. of nursery	4.0	4.2	4.1	4.3	5510	7.21
3.Treat.1+2	-	3.0	3.2	3.1	2.0	5863	14.08
4.Thiomethoxam (Actara 25wg)	0.05%	5.1	5.7	5.4	5.3	5275	2.64%
5. Thiomethoxam (Actara 25wg)	75g.ai/ha nursery	5.5	6.1	5.75	4.0	5252	2.19
6. Treatment 4+5		4.7	4.6	4.65	2.3	5532	7.65
7. Imidacloprid (Confidor 200sl.)	20%ai. 2000g ai./ha of nursery	4.2	4.5	4.35	2.6	5588	8.73
8. Carbofuran (Furadon 3 G)		2.6	3.2	2.9	1.3	5868	14.18

9. Untreated	-	6.5	7.7	7.1	7.6	5139	
I.S.D.(0.05)	-	-	-	-	-	244	-
CV(%)	-	-	-	-	-	2.6	-

EVALUATION OF NEW FUNGICIDAL FORMULATION FOR BLAST CONTROL :

Evaluation of new fungicidal formulations against leaf and neck phases of Blast was conducted as co-ordinated trial with Directorate of Rice Research Hyderabad. The 6 test formulations included in the trial, Benomyl and Folicur were evaluated at 2 doses rates while other molecules were tested at only 1 dose rate. An indigenous molecule of tricyclazole under trade name of Beam 75 wp was continued as the standard check fungicide. Benlate 75wp and saaf 75wp were included for the first time in the coordinated system, while swing 250 EC Folicure 250 EC and Kasu 3SL were tested earlier. Fugicide application schedule included the 1st spray just at the appearance of the disease, 2nd spray at 10-15 days after 1st spray, depending upon the disease pressure. The 3rd at 10-15 days after 2nd spray if neceessary and the 4th at heading stage to check the neck blast incidence. Observations were taken on 0-9 scale basis. Moderate to low infestation was recorded even in the untreated check plots.

ALL fungicidal treatment were found significantly effective in checking both leaf and neck infection and in increasing the grain yield over untreated check. Among the chemicals Baan was found highly effective in checking the infestation over all other formulations including the standard check fungicide. However it was on per with Beam and other test chemicals in increasing the grain yield.(Table no.-2)

TABLE-2: EVALUATION OF NEW FUNGICIDAL FORMULATIONS FOR BLAST CONTROL :

Fungicides (doses/Lt. of water)	Leaf Blast score (0-9scale)		Neck Blast score (0-9 sscale)		Grain yield Kg/ha
	ST	O	ST	O	
Benlate(1.0g)	2.1	3.9	2.0	3.4	2830
Benlate(1.5g)	2.0	3.7	1.9	3.0	2928
Folicure(1.5ml)	1.8	2.6	1.8	2.9	2965

K4	23.44	S
K5	28.44	S
K6	36.11	S
K7	25.66	S
K8	34.10	S
K9	27.22	S
K10	30.33	S
K11	21.55	S
K12	31.88	S
K13	24.99	S
K14	25.44	S
K15	28.66	S
K16	32.66	S
K17	32.44	S
K18	37.99	S
K19	33.55	S
K20	36.10	S
IR36	26.10	S
IET1444	20.33	S
Swarna	23.99	S

SEED TESTING

SEED TESTING

Activities of State Seed Testing Laboratory.

Seed is the most important and decisive agricultural input which holds the key to the farm productivity and profitability. Seeds with assured quality can alone respond to other inputs and management practicees in the expected manner. Though seed accounts for a small part of the total cultivation expenses but without good quality seed the investment on other inputs like fertilizers, pesticides etc. will not pay the required dividends.

Attributes of good quality seed:-

- it should be of defined pedigree,
- genetically pure,
- physically pure,
- free from obnoxious weeds;
- free from disease and pest infection;
- reasonably free from other crop seeds;
- seed should be "viable"
- seed should be duly packed in containers, properly labelled and sealed.

The seed testing involves physical analysis of the quality of the seeds interms of physical purity, germinability, moisture, seed health in the laboratory. The physiological quality of seed relates to it's vigour and viability and is affected mainly by it's content of moisture.

Since long back the State Seed Testing Laboratory, R.C.D.Farm, Arundhutinagar was working as an un-notified laboratory. However, the said laboratory has got it's legal notified status w.e.f. 20-03-2002 and as such all categories of tests are now going on. Beside this " Trupura seed Certification Agency" has been established on 04-03-2002 which leads full swing functioning of the laboratory as well as optimum utilization of the same as because of seed sample testing in a notified laboratory is mandatory under certification programme (Certification sample). There are two other categories of sample i.e.i) official sample & ii)

service sample which are also being tested. The physical progress of last 5(five) years are as follows -

Year	Sample tested	Remarks
1998-1999	381 Nos.	
1999-2000	278 Nos.	
2000-2001	358 Nos.	
2001-2002	455 Nos.	
2002-2003	1045 Nos.	Out of which 697 Nos. are certification sample.

In 2002-03 total 697 Nos. of certification samples were tested out of which 670 Nos. sample were "Recommended" for issuance of 'Certification tag' against total quantity of 1,413.845 M.T. in different lots.

All the seed lots which passed for field standards should also conform to the prescribed seed standards for issuance of cartification tag. It is not at all possible to examine each seed for it's quality in the lot. As such a small quantiity of seed is drawn from the lot in such a way that it should possess all the characteristics of the lot in the same proportion. This small quantity is known as sample, which represents the entire seed lot. Seed sampling is aimed at obtaining a sample of the required size; the compononts of which are in the same proportion as in the seed lot.

If sampling is not done properly accurate evaluation of seed standards of the lot is not poossible.So every effert is made to ensure that the sample drawn for analysis accurately represents the lot in question.

Soon after the completion of seed processing and assigning of lot number, the authorised official of the certification agency draws a representative sample as per the procedure in the presence of the seed producer/ grower and send the sample to the Certification agency's Head Office for arranging it's analysis. In the Head officee, in order to maintain the secrecy, all the seed samples submitted will be coded and sent to the notified seed testing laboratory of the area for analysis.

SEED TESTING

A sample from a seed lot is obtained by taking small quantity of seeds at random from different portions in the lot, which are named as **primary samples.**

After combining all the primary samples it forms the **composite sample.**

Further, the seeds of the composite sample are thoroughly mixed from which three reduced samples are drawn. One sealed sub-sample of prescribed size is sent to the Seed Testing Laboratory for analysis is known as **submitted sample.**

Another sealed sub-samples shall be given to the seed producer and the last one is sealed and retained by the certification agency as guard sample.

The following sampling intensity is followed for drawing seed samples.

For packed seed :-

Up to 5 containers	-	Sample each container and always take at least 5(five) primary samples.
6 to 30 containers	-	One sample for every three containers but never less than 5(five) primary samples.
More than 30 containers	-	Sample at least one in every 5(five) containers but never less than 10(ten) primary samples.

For Bulk seed :-

Less than 50 kg	-	At least 3(three) primary samples are taken
51 - 500kg	-	At least 5(five) primary samples are taken.
501 - 3000	-	One primary sample for every 300 kg but never less than 5(five).
3001 kg & above	-	One primary sample for every 500 kg but not less than 10.

For small containers :

A 100 kg weight of seed is taken as the basic unit and the small containers are com-

bined to form sampling units not exceeding this weight e.g. 20 containers of 5 kg, 33 containers of 3 kg or 100 containers of 1 kg. For sampling purposes, each unit is regarded as one container and sampling intensity presdribed earlier is applied.

The size of the submitted sample varies with the crop, it's seed size and test weight.

In the Seed testing Laboratory, the submitted seed samples are analysed for the tests desired and the results are communicated back to the produceer through certification agency in a month time, Thus it is needless to mention that seed testing is an integral part of seed certification designed to assess the planting value of the seed meterial.

BIO-FERTILIZER

INTRODUCTION :

Presently the long term Sustainability of agricultural productivity is completely depends on the increased use of chemical fertilizers. Out of various concerns associated with their indiscriminate, improper and excessive use in fields leading to soil health problems and environmental pollution problems, some may be greatly exaggerated, but some are real and need to be addressed judiciously. Under such situations, maintaining sustainability, without compromising the necessity of producing more and more is not an easy task and is rather more challenging for countries like India, where possibility of bringing more land under cultivation is remote.

Keeping all the concerns and requirements in mind, lot of efforts are being made both at policy making and scientific level to address national food security, nutritional security, maintenance of soil health, enhancement of soil fertility and determination to leave good fertile soil and pollution free environment for the future generations. It was also observed that, the so-called balanced use of fertilizer alone will not be able to sustain high productivity due to emergence of deficiency of micronutrients in the long run. In this situation INM strategies involving appropriate management practices for reduction of nutrient losses from applied chemical fertilizers, retention of soil nutrients, use of alternative and supplementary nutrient sources such as organic manures, green manures and biofertilizers and selection of appropriate INM package, based not only on cropping and farming system is the only answer. This is not only going to ensure higher productivity but will also restore and sustain soil fertility at optimum level.

Emergence of the concept of biofertilizers use as agro-inputs :

Biofertilization, as we see today is a mature agricultural biotechnology emerged from rudimentary inoculation practices to harvest atmospheric nitrogen and to make available of different plant nutrients for crops are the scientific background of this concept. Since then biofertilizers have come a long way. In Tripura, a good numbers of experimental trials conducted by the State Agricultural Research Centre in different places of Tripura, which clearly indicates the vital role of Biofertilizers in supplimentation of inorganic chemical fertilizers in deed.

Potential of Biofertilizer in Tripura :

The climate of Tripura is humid sub-tropical characterized by high rainfall. The mean

annual rainfall ranges from 2000 to 3000 mm. The humidity ranges from 100-42%. The state represents Udic Soil moisture regime and Hyperthermic temparature regime. So the normal growth of Soil microorganisms (Specially gram -ve) can not be hampered. Some soils, having very less or no organic matter at the rhizosphere may require additional supply of organic matter and repeated use of biofertilizers to made them fertile and in case of others only biofertilizers can serve the purpose.

The Soils of Tripura can be classified into five major groups. These are, Inceptisols, Entisols, Ultisols, Alfisols and Histosols and occupies 80.6, 8.1, 6.6, 4.5, and 0.2% areas respectively. (**Source** : Soil classification made by NBSS & LUP through remote sensing 1998). Inceptisols, Ultisols and Alfisols are observed in patches in the tilla lands. Entisols are observed in patches in tillas and basins. The low land areas are by and large grouped into Inceptisols with Aquic moisture regime and taxonomically better known as Aquepts. Except low land, all the soils are poor in organic matter content and acidic in nature and needs repeated use of biofertilizer with amendments to correct soil p^H to improve the soil fertility. In case of low lands only the use of Biofertilizer including BGA can suppliment the chemical fertilizers to sustain the soil fertility at optimum level. As per Bhattacharya and Mishra (1995) if the entire cropped area of Tripura were to be inoculated with biofertilizer then the total requirement of bacterial biofertilizers would be around 752.92 MT and of BGA biofertilizers of 1501.0 MT. (**Source** : Biofertilizers in N.E. Region, published by RBDC, Imphal 2003). But as per perspective plan formulated by the Deptt. of Agriculture, Tripura, the target of Biofertilizer production was fixed at about 300 MT per annum considering the 100% cropped area for a few crops. So, production of Biofertilizer has to be increased in Tripura to at least 800 MT per annum to cover a major portion of total cropped area of Tripura initially.

Development and production infrastructure :

The current advances in biotechnology have resulted in renewed interest on use of microorganism for nitrogen and phosphate nutrition in agriculture in the form of Biofertilizers. Further, the present concern of environmental hazards caused due to excessive use of chemical fertilizers and contaminated food besides the present need to suppliment crop nutrition biologically have emerged large scale use of Biofertilizers in India. In order to cater the requirement of Tripura for maintaining long term sustainability of soil fertility upto the optimum level, one Biofertilizer production centre was established at Arundhutinagar, Agartala in the

PERH-1096	Kapurthala	99	284	45	182	3346
PERH-1099	Kapurthala	99	324	52	128	3807
UPHR-1841	Pantnagar	100	302	39	125	3113
UPRTGH-163	Pantnagar	92	278	24	148	3617
HKRH-1059	Karnal	105	356	28	154	4790
CRHR-1	Cuttack	107	379	29	131	4632
CRHR-5	Cuttack	106	352	40	171	5374(4)
XR-1803	POC	104	381	39	145	3928
HRI-147	Hybrid Rice Intl	106	283	19	151	4951
EXPH-664	Parry Monsanto	100	338	27	170	5359(6)
EXPH-665	Parry Monsanto	101	376	23	162	5350
EXPH-666	Parry Monsanto	101	382	31	166	6027(1)
SPH-1	Swagath Seeds	101	338	49	133	4431
SPH-304	Swagath Seeds	105	279	38	129	4645
PAC-80015	Advanta(I)Ltd	100	334	30	134	5558(3)
AMAR-SIRI-3	Amareshwara	105	370	69	130	3073
AMAR-SIRI-18	Amareshwara	99	403	60	135	3798
ZRH-153006	Zuari Hybrid Seeds	93	340	28	124	4563
IAHS-200-014	Indo American	104	325	38	148	4177
PRH-128	Hindustan Lever	105	369	21	153	5740(2)
JAYA	National Check	97	250	34	113	3457
KRH-2	National Check (Hybrid)	102	407	16	137	5366
NDR-359	Regional Check		104	302	17	120
5001(5)						
Salivahana	Local Check	114	328	44	106	4131

* Average of 25 panicles per plots.

Based on the performance only three hybrids has registered a yield advantage of more than 10% as compared to best check (NDR-359 Regional Check) at this center. These are given below:-

Sl.No.	Name of Hybrids	Yield advantage(kg/ha)	Yield advantage (%)
1.	EXPH-666	1026	20.52
2.	PRH-128	739	14.78
3.	PAC-80015	557	11.14

It revealed from the trial that following hybrids have recorded the positive yield advantage as compared to the National hybrid checks (KRH-2).

Sl.No.	Hybrids	Yield advantage (%)
1	EXPH-666	12.32
2	PRH-128	6.97
3	PAC-80015	3.58

1.4. SLENDER GRAIN VARIETY TRIAL :-

Quality consciousness becoming an important consideration to the consumers of the urban areas of the state & also to the farmers who are producing it for getting higher market price. To meet up the demand, slender grain variety trial was indented to Directorate of Rice Research, Hyderabad to identify high yielding genotypes which fulfill the quality norms fit for Tripura condition.

1.4.1. ADVANCED VARIETY TRIAL -2 SLENDER GRAIN (AVT-2 - SG) KHARIF 2002 :-

The trial consisting of 7 entries including 3 checks(IR-64, PR 106 & Najir sail as local) was conducted at R.C.D.Farm, Arundhutinagar during kharif 2002.

Quality analysis of the entries could be not done at this station due to lack of infrastructural facilities,which was done at Directorate of Rice Research, Hyderabad for 12 important quality parameters.(Table-II).

IET NO	Designation	Days to 50% flowering	Panicle /sqm.	Plant height (cm)	Grain yield (kg/ha)	Grain type
17170	JR 507-112-1	95	178	159	3600(2)	LS
17171	JR-504-107-1	95	163	175	2559(5)	LS

17184	RP2235-97-82-19-SS	85	316	105	2250	LS
17190	RP4380-1015-1-SS	101	180	114	4010(1)	LS
IR-64	CHECK	97	349	104	3380(3)	
PR-106	CHECK	103	380	114	2933(4)	
Najirsail		CHECK	110	183	175	2050
EX.MEAN		98	250	135	2969	
CD(05)		1108				
CV%		21.0				
D/S		05.07				
D/P		0.08				

It revealed from the table that out of four entries tested only two entries, IET 17190 & IET 17170, showed more than 5% yield improvement over the best check IR-64.

IET 17190(RP 4380-1015-1-SS), a derivative from the cross GEB -24/ Manoharsail stood 1st with 4010 kg/ha grain yield at this center and also ranked 1st in All India mean grain yield with 4300 kg/ha. It exhibits yield advantage over the checks, IR-64, PR-106 & local check Najir Sail by 18.64%, 36.7% & 95.6% respectively. It possesses long slender grains and flowered in 101 days.

IET 17170(JR 507-112-1) from the cross Dubraj X IR-36 ranked 2nd with a grain yield of 3600 kg/ha at this station while it stood also 2nd in All India mean grain yield (3995 kg/ha). It showed 6.5% over IR-64, 22.74% over PR-106 & 75.61% over local check respectively. This entry recorded 95 days to flower with long slender grains.

Summary of the grain quality characteristic of test entries including two National check:-

Table-II

IET NO	MILL (%)	HRR (%)	KL (mm)	KB (mm)	L/B ratio	GRAIN Type	GRAIN Chalk	VER	WU (ml)	ASV	AC (%)	GC (mm)
17170	69.75	66.0	6.52	1.95	3.34	LS	VOC	5.33	297	6.0	20.67	84
17171	71.0	68.2	6.41	1.84	3.48	LS	A	5.09	340	7.0	20.32	79
17184	71.3	56.6	6.60	2.07	3.18	LS	A	5.49	255	5.0	24.46	52
17190	70.75	62.0	6.85	2.20	3.11	LS	VOC	4.85	320	7.0	24.33	77

Summary of data on grain yield and ancillary charachters of selected board cultures under transplanted condision at graded levels of recommended N Fertilizer dose

Treatments N-level	Varieties	Grain yiedl (t/ha)	Panicle/m2 (No)	Panicle Weight (in gm)	N res. (kg grain/kg N) Base-50kg N/ha
N1	V1	5.52	343	1.10	---
50kg N/ha	V2	6.56	315	1.52	---
	V3	6.35	341	1.22	---
	V4	6.28	317	1.45	---
N2	V1	6.65	393	1.66	22.60
100 kg N/ha	V2	7.27	303	1.38	14.20
	V3	6.58	361	1.43	4.60
	V4	7.06	424	1.04	15.60
N3	V1	6.33	430	1.18	6.20
150kg N/ha	V2	6.29	432	1.37	-5.40
	V3	7.69	303	1.65	26.85
	V4	6.06	424	1.04	-4.40
	CD (0.05)				
	Nat same V	NS	32	0.28	
	V at sam V	NS	34	0.29	

STATE COMPOSITION

1996-2002

AGRONOMIC PRACTICES FOR INCREASING NITROGEN -USE EFFICIENCY AND PRODUCTIVITY OF FLOOD-PROVE LOWLAND RICE ECOSYSTEM.

Rice is grown under three major ecosystem : rainfed upland , rainfed low land and irrigated medium land. Rice cultivation in Tripura is characterised by predominantly rainfed farming under uplands and lowlands, monocropping, Low spread of high yielding varieties and fertilizer use. Rainfed lowland occupy about half of the total rice area where the crop experiences deficit moisture in the early or terminal stages of growth and excess water stress of varying depth and duration during the grand growth period. Depending on the depth of water accumulation in the field , these lowlands are classified into shallow water (0-30cm), intermediate (0-50cm), semi-deep (>0-100cm) and deep (100cm) water ecosystem. Drainage of excessive and free flowing flood water is not feasible in this areas even appropriate agronomic management including efficient use of fertilizer also becomes impossible.

The yields of rice in flood -prone lowland conditions are low and highly variable due to several factors-abiotic (deficit or excess water stress, low light intensity, and poor crop management) and biotic (Weeds,insects, disease and other pests etc.)

Considering all the above problems, several trials were conducted during last 5 years to isolate different agronomic management practices for inproving Nitrogen use efficiency and productivity of Rice grown under flood prone low land condition. Through intensive trials several improved technologies with considerable advantage over the existing practice has been identified . These technologies have the potential to increase rice productivity under rainfed flooded lowlands. The suggested recommendations are technically simple, low input and non-monetary in nature, and have a great applied significance from the standpoint of increasing rice productivity over the large areas under flood-prone lowlands in Tripura.

RECOMMENDATION OF IMPROVED TECHNOLOGIES FOR INCREASING PRODUCTIVITY OF FLOOD PRONE LOW-LAND RICE ECOSYSTEM

PRODUCTION FACTOR	EXISTING PRACTICES	IMPROVED PRACTICES	REMARKS
Nitrogen	Farmers apply low doses of N (10-15kg /ha), mostly as an early top dressing.	Optimum Doses of N Fertilizer are 80kg N/ha in intermediate low lands for semi-dwarf rice varieties and 50-60kg N /ha in semi - deep and deep water condition for semi tall to tall varieties. Basal N placement in the plough furrow, one-third of N may be top dressed through USG(if available) in intermediate low lands when the water depth is <20 Cm during the early Vegetative stage but single basal application under higher water depth conditions.	Fertilization with N enabled better tolerance to submergence and recovery of rice plants in floodprone lowland conditions. The yield increase due to N application was>1.0t/ha in intermediate lowlands and 0.5 - 1.0t/h in semi-deep to deep water conditions. Sometimes, the unfertilised crop perished completely under extreme flooding conditions.
Organic manuring with FYM	FYM available in small quantities at the Farm Level is mostly applied in favourable irrigated or shallow water situations but not in the risk prone lowland situations.	Organic manuring with FYM at 1 ton/ha one week before sowing + 20kg N/ha at sowing through urea fertilizer.	Organic manuring produced the same yield as with 40kgN/ha as urea.Combined use of Fym and N Fertilizer realised maximum yield by ensuring continued N availability throughout the crop growth period.
Green manuring with Dhanicha	Green manuring with dhanicha is practised in some irrigated medium lands where rice is established.	Growing rice and dhaincha alternate at 15 Cm spacing and incoroprating dhaincha at 50 days of growth in inter-	Despite some poor initial growth of rice plants grown along with dhaincha, the yield performance was at

PRODUCTION FACTOR	EXISTING PRACTICES	IMPROVED PRACTICES	REMARKS
	through transplanting after thorough puddling. Green manuring of direct sown flood-prone lowand rice is not followed.	row spaces, besides basal application of 20 kg N/ha as urea.	per with 40kg N /ha as Urea. Basal application of 20kg N /ha was essential to promote early Crop vigourr and off-set the competition effects of dhaincha. This system was found not only feasible but also economical in the direct sown flood-prone low-lands.
Nursery Fertilization	Farmers usually transplant thin, tall and yellowish seed-lings raised without any ferti-lizer application in the seed bed. Further, poor quality seeds are sown in adequately prepared fields.	Fertilization in the nursery @ 100kg N/ha,besides using high-density seeds for sow-ing in finely-prepared raised seed -bed.	Fertilized seedlings were taller with more dryweight and established better in the excess water regime In-crease in yield due to trans-planting of fertilized seed-lings ranged from 0.5-1.0t/ ha over unfertilized seed-lings and was greater under simulated flash-flooding than under natural submergence conditions. Application of 100kg N /ha in the nursery seed bed amounts to only10kg N/ha in the main field, and therefore, this ap-proach is cost-effective for improving productivity of transplanted rice in flood-prone lowland areas.

The yield data recorded significantly higher yield (23 N/ha) at 40 : 60 : 40 NPK kg/ha over control , 10 : 20 : 10 and 20 : 40 : 20 kg NPK/ha . The yield of the fertilizer level at 20 : 60 : 20 and 30 : 60 30 NPK kg/ha significantly higher (22 .5/ha), (21.88 Q/ha) than yield of control (12.41 Q/ha) and 10 :20 : 10 NPK kg/ha (15.16/ha) but have no significant difference with the yield of 40 : 60 : 40 kg NPK/ha.

However further research work on Soyabean is essential to develop suitable Agronomic practices under Tripura condition . The Soyabean a leguminons oil seed crop can play a vital role in the upland rainfed cropping system due to its soil and human nutritional value as well as economic value of the crop.

AGRONOMIC
MULTILOCATION TRIAL

Current fertilizer management practices for crop production, in general , are not precisely tailored to differences in soil nutrient supply and crop demand which vary considerably with soil and crop conditions . Blanket recommendations for an entire region are very common with less importance given to the management induced variations between farms which is generally larger than the differences among soil types. Emperical approach of specifying fertilizer recommendations based on critical soil test levels and response ratio soften does not take into considerations actual nutnient requirment for targetted yields and the interaction with other nutrients. Further, considering the wide range of critical soil test values that have been reported for rice, balnket prescription covering large domains, over the years, have .Lead to imbalance in soil nutrient supplies, more so under intensive cultivation.

As such keeping confromity with the present day concept of "Precission farming" we want to develop location specific fertilizer recommendations as far as practical on all major crops of Tripura primanily we have initiated multilocation trials on principal crop of the state i.e rice. the trials has been again taken up on two asspects vize, sustaninbility of rice based cropping system in relation to mutrient management and optimal nutnient management and Nitrogen use efficiency . These trials has been initiated from the crop year 2002-2003 and being continued . The trial on nutrient management and sustainble productivity is being carried out to some of the depantmental management farms and optimal nutrient and Nitrogen use efficiency are at farmers field.

The detail analysis has not made as yet. We are in a plan to continue the trial for at leart 3 crop year in both the season before inferring the findings. However the indication of results of the trials along with the trial details are given herewith.

NUTRIENT MANAGEMENT TO SUSTAIN PRODUCTIVITY OF RICE BASED CROPPING SYSTEM.

EXPTDESIGN : SPLIT PLOT

REPLICATION : THREE

TREATMENTS

MAIN PLOT : SOIL FERTILITY RESTORER/MAINTAINER

SM0 = NO ONE/FYM

SM1 = FYM @ 10 MT/HA

SM2 = BASIC SLAG@600 KG/HA

SUBPLOT : FERTILIZE SCHEDULE

		N : P : K
F1	=	0 0 0
F2	=	80 : 40 : 40
F3	=	80 : 0 : 0
F4	=	80 : 40 : 40
F5	=	80 : 0 : 40
F6	=	40 : 20 : 20
F7	=	120 : 60 : 60
F8	=	N as per leaf color chart + 40 P + 40 K

Method of Fertilizer application

N- 3 split (50 % basal + 25 % at 25 Dat + 25 % at 50 DAT)

P- all basal

K = 2 split (75% basal + 25 % at 50 Dat)

Basic slag 10- 15 Days before planting

LCC - as per LCC value

The trial was laid out in department farms in several location. The average of the several location data indicates that FYM and basic slag application has significant effect on yield attributing charachters. The basic slag application showing advantage on the grain yield over all the main plot treatments in all locations. The high intersive cropping pattern specially Rice -Rice may have greater response on the applicatinn of basic slag. In consideration to land type influence of basic slag are more prominet on Medium and low land rainfed conditon where soil moisture level remains over field capacity level. The FYM has shown moderately positive responses in all types of land under aerobic and anerobic condtion. Further investigation is under progress at various ecosystem of the rice based cropping system.

RICE PRODUCTIVITY IN RELATION TO NUTRIENT APPLICATION AND N- MANAGEMENT IN THE FARMERS FIELD

EXPERIMENTAL DESIGN :- RBD

REPLICATION :- 3

TREATMENT :

T1 - Farmers practice of fertilizer use (30 : 20 :20 NPK kg/ha)

T2 - 60 : 30 : 30 NPK kg./ha

T3 - 80 : 40 : 40 NPK kg/ha

T4 - 100 : 50 : 50 NPK kg/ha

T5 - 120 : 60 : 60 NPK kg/ha

T6 - 40 : 20 : 20 NPK kg/ha + foliar appln of water solubel NPK compund (19 : 19 : 19)

T7 - 50 : + 20 : + 20 NPK kg ha + foliar appln of water soluble NPK compound.

T8 - 60 : 30 : 30 NPK kg/ha + Foliar appln of water soluble NPK compound

FERTILIZER APPLICATION SCHEDULE

T1 = Farmers practice

T2 to T5 = N 3 S plit (50% basal + 25 % 21 DAT + 25 % 42 DAT)
P All Basal , K= 2 S plit (75% basal + 25 % 50 DAT)

T6 to T 8 = Full NPK dose as basal + foliar application of water soluble NPK compound @ 3kg/ha in 300 lts water at 25-28 DAT.

The yield data from few locations have been recieved only . As such any analysis has not been done as yet.

PEST MANAGEMENT

PEST MANAGEMENT DIVISION

Integrated Pest Management has been accepted and is being followed as a national policy in the field of plant protection in India for past three decades. This has become essential to avert the adverse effects resulting from over reliance on pesticide use as the only method of pest & discase control. Therefore, efforts has been continued to simaltaneously develop other methods of pest management like host plant resistance, use of sex pheromones & light traps, biological & cultural methods , use of botanical pesticides & use of newer and novel groups of pesticides.

Pest Management Division of R.C.D.Farm, A.D.Nagar also aims at generating scientific information for the development of Integrated pest management technologies for all rice ecosystems of the Tripura State and other cereals like wheat, Maize and Pulses & oil seed crops to complement sustainable production systems for successfull implementation of 10 years perspective plan for self sufficiency in food of our State. Development of rice cultivars resistant to major insect pests through genetic improvement is one of the most practical and reliable approaches to achieve the goal. It is possible by identifying rice donors with resistance to multiple pests including not only major pests like stemborer, brown plant hopper, white backed plant hopper leoffolder and gall midge but also to sporadic pests like gundhibug, rice hispa etc.

Use of pesticides continues to be one of the core components of pest management despite certain demerits like pesticides induced pest resurgence, environmental pollution etc. Hence evaluation of newer and novel groups of pesticides with consideration to their ecological selectivity and economic viability continues to receive due attention under the trial programme. The major task has been to bring forth newer insecticides which are effective, ecologicaly sound as well as economical for use by the farmers.

Through light traps & pheromone traps continuous monitoring of the insect pest populations will be taken up for understanding the change in pest status.

INSECTICIDE EVALUATION TRIAL (I E T)

The major objective of this trial is to evaluate the efficacy of avajlable new insecticides in granular and spray formulations against major insect pests.

year 1993, with the financial assistance of N.E.C. Shillong. The centre namely Regional Biofertilizer Production Centre, Dutta tilla, Matripalli, under the state Agricultural Research Centre have started functioning from the year 1994-95 commercially and continued with small scale production programme.

Microbial products being produced and distributed by the Centre :

- All species of Rhizobium for legume crops.
- Azotobactor for non legume crops / fruit plants / Vegetables
- Azospirillum for non legume crops / Vegetables / Fruit plants
- Biophos as phosphate solubilizer for all crops.

Activities of the production centre :

1) Production and distribution of quality biofertilizer to the farmers of Tripura at no loss no profit basis.
2) To maintain and ensure availability of different microorganism used in biofertilizer production by the centre or the NOG's, if any.
3) Evaluation and identification of crop specific and location specific effective strains under Tripura conditions.
4) To take up various extension activities such as training of farmers and staff, demonstrations in the farmers field etc. for popularisation of the use of biofertilizer in the field.
5) To develop Human resource of NGO's to conduct broad based training of farmers and to create general awareness in the farming community.

Sources of mother culture used for the production programme :

- NBDC, Ghaziabad.
- RBDC, Imphal
- BCKV, West Bengal
- Locally isolated by RBPC, Arundhutinagar,

Quality control of produced Biofertilizer :

Presently the sample packets of produced biofertilizers are sending to RBDC, Imphal for quality testing before distribution to the farmers but on establishment of quality control unit within the centre, the same may be done by itself. In this connection a project proposal have already been submitted to the planning Department, Govt. of Tripura for sanction of an amount

of Rs.75 lakhs under Additional Central Assistance (ACA).

Production target of the centre at Arundhutinagar :

The present production capacity of the centre is only 6 MT per year. On availability of adequate facilities with the centre, it can produce 150 to 200 MT biofertilizers per year. A project proposal have already sent to NEC shillong for an amount of Rs.50 lakhs, for the purpose. Moreover, in view of the wide scope available with the state a separate project proposal also been submitted to GOI for sanction of 5 crore for establishment of 10 (ten) more biofertilizer production centre in Tripura covering all the Districts to meet up the farmers demand in the state.

Biofertilizer production scenario of the centre during last five years :

Sl. No.	Year	production in MT	value in Rs.	Remarks
1.	1998-99	1.534	46,020/-	• Size of the packet - 200g.
2.	1999-00	1.431	42,930/-	• self life - 6 months
3.	2000-01	4.500	1,35,000/-	• Due to renovation works
4.	2001-02	5.920	1,77,000/-	of lab. building the
5.	2002-03	1.800	54,000/-	production programme remain suspended for six months in the year 02-03.

(The sale rate of Biofertilizer has been fixed to Rs.30,000/- per MT by the MInistry of Agriculture, Govt. of India, whcih is followed by the centre against sale proceed through T.C. bill.)

Programme on evaluation of local effective strains :

Following the concept of IPNS, this centre is also taking up some specific programme to study with the locally available strains from different Agro-climatic situations of Tripura, to maintain and multiply for field application due to their well adoptibility in the problem soil also. This centre have already isolated almost all the strains of Rhizobium, Azotobacter Azospirillum and PSB, separately from different locations and undergone for the study of their efficacy in comparison with the outside strains to find out the location specific effective strains for future use.

Training Programmes on popularisation and use of Biofertilizer, conducted by the centre :

Year	Farmers training Nos.	Field staff training Nos.	Officers training Nos.	NGO's Pvt. dealers training Nos.	Total Nos.
1996	5	2	1	-	8
1997	10	-	-	-	10
1998	5	-	-	-	5
2000	-	-	-	1	1
2001	-	-	1	-	1
2002	9	-	1	-	10
Total	**29**	**2**	**3**	**1**	**35**

Farmers field Demonstration Conducted by the Centre:

Year	No. of Villages Covered	Crops taken	Type of Biofertilize crused
1996	5	Wheat	Azotobacter & PSB
1997	5	Pea & Gram	Rhizobium & PSB
1998	5	Upland paddy	Azotobacter & PSB
2001	2	Cotton & paddy	-do-
2002	5	Cabbage & paddy	Azospirillum & PSB
Total	**22**		

RESEARCH FINDING ON POTENTIAL OF BIOFERTILIZER UNDER AGRO-CLIMATIC SITUATIONS OF TRIPURA

(1) Influence of Azotobacterization in presence of phosphate solubilizing microorganism on the yield of Potato.

Roy, D.R., Dasgupta, A and Ta, I (1998) Regional Biofertilizer Production Centre, State Agricultural Research Centre, Agartala.

This experiement was laid out as an observation study during winter season (Rabi) under sandy loam upland situation of Dutta tilla, State Agricultural Research Centre, Arundhutinagar. The P^H of the soil varied from 4.2 to 5.0 and total nitrogen 1.63 to 1.89 %. For inoculation seed potatoes were throughly coated with a paste of Azotobacter ehrococum culture and water (1:2:5) and for soil inoculation the culture was mixed with compost (1:10), kept overnight and applied in furrows, before earthing up. The cultures were obtained from Nodule Research Laboratory, Bidhan Chandra Krishi Viswavidyalaya, West Bengal.

Treatments	Tuber yield (T/ha)
1. Control N:P:K:-120:80:100	30.84
2. Fertilizer only N:P:K:- 60:40:100	24.71
3. Fertilizer N:P:K:-60:40:100 + Biofertilizer as seed treatment	32.00
4. Fertilizer N:P:K:- 60:40:100 + Biofertilizer as seed treatment and soil treatment at 30 DAS	33.54

The result indicates the declination of tuber yield with the reduction of fertilizer N & P by 50% of recommended dose (T_2). The application of Biofertilizers however could increase the yield over control with the reduced dose of fertilizer (T_3+T_4). The result also indicated the duel application of biofertilizer was effective in increase in yield to some extent. The experiment also suggests for reduction of fertilizer N with the application of Biofertilizer upto 60% or more. In this connection, the work done by Jagtap and Singte 1982 may be referred in case of wheat. Moreover, Azotobacterization resulted in significant increase in growth and yield of

Barley, Wheat, Potato, Mustard and Sugarcane, confirmed by Subba Rao, 1977. However further studies in Tripura condition may suggest in detail.

(2) Effect of amendment and sources of P_2O_5 on the nodulation and yield of Black gram.

Bhattacharjee, D.K., Dasgupta, A and Islam, F (1991) Agronomy Unit, State Agricultural Research Centre, Arundhutinagar, Agartala.

This experiment aims at evaluating the effect of Rhizobium inoculation with different sources of P_2O_5 on the yield and nodulation of black gram. The trial was laid out during kharif season under the farm area of State Agricultural Research Centre, Arundhutinagar. The soil was poor in organic matter content (0.97-1.5%) and sandy loam in nature. The pH of the soil varied from 3.8 to 4.5 and total nitrogen 0.89 to 1.15%. The dose of fertilizer N and K was equal for all the treatments @ 20Kg/ha each. The treatments consisted of basal application of Phosphatic fertilizer of two sources (SSP & RP) either/or basis in six treatments. Nitrofix is a compound of Ca and Mo which was applied alone or in combination with fertilizer P in three treatments (T_6,T_7 & T_8). Lime was applied as CaO @ 500kg/ha as amendment to correct the soil acidity in two treatments (T_4 & T_5). There were 8 treatments were replicated thrice in a rendomised block design. In all the treatments seeds were inoculated by the Rhizobium culture collected from Nodule Research Laboratory, Bidhan Chandra Krishi Viswa vidyalaya, West Bengal.

Treatment	Average number of nodule per Plant	Yield Q/ha
T_1-Control	14.80	2.14
T_2-Single Super phosphate (SSP)	23.13	4.58
T_3-Rock Phosphate (RP)	19.80	3.64
T_4-SSP + CaO	30.60	8.99
T_5-RP + CaO	29.66	5.02
T_6-SSP +Nitrofix	20.00	4.97
T_7-RP +Nitrofix	19.86	3.77
T_8-Nitrofix	15.40	3.48
CD 5 %	6.73	2.69

Highest yield was obtained at T_4 and was significantly superior then T_5. Similarly number of effective nodules per plant was also higher in T_4, which indicate the role of SSP along with amendment was remarkable in nodule formation as well as in increasing yield of Black gram in comparison to RP. Benifit of using Nitrofix however was not pronounced in the formation of nodule and yield increase, that might be due to the acidity of the soil under study area.

(3) **Efficacy of Bio- and Chemical fertilizer on the yield of lowland Rice**

Bhattacharjee, D.K and Dasgupta, A (1991) Agronomy Unit, State Agricultural Research Centre, Arundhutinagar, Agartala.

This field experiment was taken up to study the effect of Azolla and BGA alone or in combination with fertilizer N on the yield of rice and laid out in the lowland of State Agricultural Research Centre, Arundhutinagar. The soil pH was 5.3, organic carbon 1.38% and total nitrogen was 1.35%. All the nine treatments were replicated thrice under randomized block design. A basal dose of fertilizer P & K was applied @ 40 kg each to all the plots. The treatment consisted of without fertilizer N in three treatments (T_1, T_2 & T_3) and others were treated with 40 Kg/ha as urea. A mixed inoculum of algae was applied in three treatments @ 10 kg/ha and Azolla was grown in advance in adjoining ditches and incorporated @ 10 t/ha after one week of transplanting of rice.

Treatment	Rice yield (Q/ha)
T_1- Control (no nitrogen)	25.14
T_2- B.G.A. (no nitrogen)	27.01
T_3- Azolla incorporation (no nitrogen)	25.09
T_4- N @ 40 kg/ha (Basal + 3 split)	29.13
T_5- N @ 40 kg/ha (Basal + 3 split) + BGA	31.03
T_6- N @ 40 kg/ha (Basal + 3 split) + Azolla incorporation	30.08
T_7- N @ 40 kg/ha (no basal + 3 split)	27.12
T_8- N @ 40 kg/ha (no basal + 3split) + BGA	33.76
T_9- N @ 40 kg/ha (no basal + 3 split) + Azolla incorporation	31.80
CD at 5%	3.63

From the result it was clear to mention that grain yield of rice increased significantly in N applied plots as was evident in treatments T_4 to T_9. Incorporation of Azolla alone or with 40 Kg N/ha was not found beneficial while algal inoculation alone or with 40 kg/ha produced significant difference in yield.

Interestingly, algal inoculation with fertilizer N (no basal + 3 split) (T_6) produced higher yield as compared with that of basal + 3 split use of N alone (T_4) or in conjunction with algae (T_5). Apparantly it can say that, algalization could take care of the initial nitrogen requirement of rice crop and may be used in place of any basal application of fertilizer nitrogen.

(4) Effect of Rhizobium inoclation in different pulses under upland condition

Bhattacharjee, D.K. and Dasgupta, A (1992), Agronomy Unit, State Agricultural Research Centre, A.D. Nagar

This observation plots were taken to study the effect of Rhizobium inoculation on the yield of pulses under upland agro climatic situation. The soil happened to be low in organic carbon (0.97 to 1.20 %) and sandy loam in nature. The pH of the soil was found to be varied from 3.6 to 4.3 and total nitrogen 0.88 to 1.05 %. All the twelve plots under study were treated with lime @ 500 kg/hac to correct the soil acidity and to create suitable environment to increase the microbial activity on that soil, one month before the date of sowing. For treated plots the seeds were inoculated with Rhizobium culture collected from Nodule Research Laboratory, Bidhan Chandra Krishi Viswavidyalaya, West Bengal and randomised with untreated control plots of all the six crops. A basal dose of 10 kg N, 40 kg P_2O_5 and 20 kg K_2O/ha was applied uniformly in all the plots (4mx5m) each.

Sl. No.	Crop	Yield		Percentage yield increase
		Untreated control	Treated with Rhizobium over control	
1.	Green gram	7.5	9.6	28
2.	Black gram	7.8	9.9	27
3.	Groundnut	11.0	12.5	14
4.	Cow pea	8.3	9.9	19
5.	Arhar	10.8	12.4	15
6.	Soyabean	13.5	17.5	30

It has been observed from yield data of the treated plot that yield have increased remarkably in all the crops. The percentage of yield increase over control varied from crop to crop, which was very low and almost equal in case of Groundnut and Arhar. Again it was higher in case of Soyabean, Green gram and Black gram. The lower percentage in yield might be the indications of the presence of sufficient numbers of native Rhizobium cell in case of Groundnut, Arhar and cowpea in comparison to the higher percentage of yield by Soyabean, green gram and black gram. However further studies in different locations of Tripura may give us a detail information on the presence of location specific effective strains of Rhizobium in future.

(5) Studies on the Combined use of fertilizer NPK and Azolla on the yield of Transplanted Aman Rice

Bhattacharjee, D.K., Majumder, B.I. and Dasgupta, A (1992) Agronomy Unit, State Agricultural Research Centre, Arundhutinagar, Agartala.

This observation plots were taken to study the possibility of reduction in the use of fertilizer N which is to be supplimented by Azolla green manuring. Rice (var. Rasi) was grown in five plots under water logged soil of Research Centre, Arundhutinagar. Azolla was grown in the small ditches nearby trial plots and applied @ 10 t/ha by incorporation along with fertilizers in all the plots except control. Azolla was applied in the plots one week after transplanting

Treatments	Grain yield (Q/ha)
T_1- Control (fertilizer only) N:P:K- 80:40:40	30.16
T_2- Azolla incorporation (No fertilizer)	33.43
T_3- Fertilizer N:P:K-80:30:30 + Azolla incorporation	45.06
T_4- Fertilizer N:P:K-60:30:30 + Azolla incorporation	42.15
T_5- Fertilizer N:P:K-40:20:20 + Azolla incorporation	37.79

The experiment indicates about the increase in grain yield over control with the use of Azolla as green manuring. Only Azolla without any fertilizer (T_2) however could not show any remarkable increase in yield over control. Highest grain yield was observd with higher dose of fertilizer N in combination with Azolla (T_3) in comparison to lower dose of fertilizer N with Azolla (T_4 & T_5).

On study with the plant growth of all the treatments, the maximum growth including plant height was observed in T_3, where the plants shown a major drooping characteristics after grain setting, which was not observed in other treatments. This might have occured due to higher dose of fertilizer N in combination with green manuring. So the result suggests to adopt the next lower dose of fertilizer N with Azolla incorporation (T_4) where a sharp reduction of 20 kgN/ha was possible. However further study in this aspect may inform us in detail.

FUTURE PROGRAMMES OF THE CENTRE :

1. Production and distribution of cellulose decomposer, VAM fungi and other Biofetilizers.
2. Production of biofertilizer in liquid formulations.
3. Production of BGA in large scale to supply pure BGA to the farmers round the year.
4. Maintainance of microbial germplasms.
5. Setting up of a serological unit with the existing production unit for effective quality control of produced Biofertilizers by the centre or NGO's.
6. Intensification of extension activities for the use and benefit of the farmers.
7. More effort has to made to explore the native microbial flora.
8. Research work and studies on the use of phosphate and potash solubilizing microorganisms under local soil conditions.
9. Evaluation and identification of native crop specific and location specific effective strains and their use.

BIO-CONTROL

EXPERIMENT ON DIFFERENT BIO-CONTROL AGENTS PRODUCED AT STATE BIO-CONTROL LABORATORY

BIOLOGICAL MANAGEMENT OF BLACK ROT OF CABBAGE CAUSED BY XANTHOMONAS CAMPESTRIS PV. CAMPESTRIS.

Amomg different diseases of cabbage black rot caused by xanthomonas campestris is the second most important after damping off and considered as the most serious bacterial disease of the crop.

The pathogen is both seedborne as well as soil borne in nature. Seed serves as the primary source of inocolumn and slow rate of seed contamination may initiate severel disease out break soil helps in secondary spread of the out break of the disease. The seed borne pathogen is both externally & internally carried in the seeds.

For effective management of the disease, therefore eradication of the pathogen at the primary level i.e. in the seeds and seedlings is very essential, which reduces the disease pressure at later stage.

The observatory experiment was conducted in the earthen pots following CRD with three replication with the following treatments.

T1= control

T2= seed dressing with pseudomonas fluorescens (PF)

T3= seed dressing with Trichoderima viride (TV)

T4= seed dressing with Trichoderma harzianum (TH)

T5= seedling root dip with PF

T6= seedlings root dip with TV

T7= seedlings root dip with TH

T8= seed dipped in PF

T9= seed dipped in TV

T10= seed dipped in TH

T11= seed dress + seedling dip in PF

T12= seed dress + seedling dip in TV

T13= seed dress + seedling dip in TH

T14= seed dip + seedlings dip in PF

T15= seed dip + seedling dip in TV

T16= seed dip + seedling dip in TH

Seed treatment incombination with seedling treatment with pseudomonas fluorescens was found to be best effective against disease infestation on serverity. Seed treatmint observed better than seed dip. Visual observation shows that P. Flourescens is the most effective.

A detailed in depth investigation is required on this as cabbage specially off season, is gathering impertance as most profitable crop to the farmers of the states.

Management of sclerotium rolfsii in Tomato by fungal antagonist

Sclerotium rolfsii sacc. is a non specialised soil borne pathogen of world wide importance & was a host range of over 500 plant species in about 100 families. The pathogen has been found to be caused collarrot, & foot rot of tomoto in the fanmers field of Tripura. The disease possesses a serious threat to commercial cultivation of the crop in the state. It occurs during the month of march - April in late varieties and Infection appears on the basal portion of the stem near the root. The chemical control of the pathpgen the pathogen has not been satisfactory mainly because of the longevity of sclerotial population in soils & ground water.

A field trial was conducted to evaluate the efficacy of Trichoderma viride and Trichoderma harzianum, against sclerotium rolfsii causing callar rot of tomato.

Soil application of culture of Trichoderma spp at the time of tpansplanting reduces the disease incidence. Minimum disease incidence was recorded in Trichoderma harzianum treated plot followed by Trichoderma viride similarly, in creased yield was recorded in plats with the application of antagonist. Trichoderma spp are known for their biocontrol ability against s. rolfsii.

PLANT EXTRACTS FOR MANAGEMENT OF BACTERIAL LEAF SPOT OF BETELVINE.

The present decade has seen a considerable change in the disease management strategies when plant pathologist arround the world have been trying to explore some innovative technique for the management of major crop diseases with limited use of chemicals. In view of increasing health hazards due to pesticidal polluation, plant products have gained the attention of several workers as a substitute for chemical pesticides. Fairly large number of plant sare known to possess antifungal and antibacterial properties. Some of the plant species that are under extensive studies for exploiting medicinal properties Eucalyptus citridona Ocimum sanctum, Allium sativum, polygonum equisetiforms, Twalictnum follolosum. with this back ground a screening programme was under taken to test the efficacy of medicinal plants against Xanthomonas axonopodees PV betlicola. The incitants of bacterial leaf spot of beetlevine . The aqueous extracts of these plants were evaluated for reduction of disease severity.

LIST OF MEDICINAL PLANT EXTRACTS TESTED AGAINST Xanthomonal campestros PV betlocola

SL NO	PLANT SPECIES	ENGLISH NAME	LOCAL NAME	PLANT PARTS USED
1.	Allium sativum L.	Garlic	Rasoon	Bulb
2.	Allium cepa l.	Onion	Onion	Bulb
3.	Cucumis sativus	cucumber	sasha	Leaves
4.	Abnus precatonius L.	The crabs eye	-	Leaves
5.	mentha viridis	Field mint	podina	Leaves
6.	curcuma Longa L.	Turmeric	Holodhi	Phizome
7.	Nimosa pedica	Sensative Plant	Lajukilata	leaves
8.	Zingiber officinaleRase	Ginger	Ada	Rhizome
9.	Psidium guajava L.	Guava	Peyara	Leaves.
10.	Aloe Vora	India aloe	Aloe	Leaves
11.	Wedelia chinensis coscheek	Bhringaraj	Mahabringaraj	Leaves
12.	Mangifera indica L.	mango	Aam	Leaves
13.	Moringa prerygosperma	Drumstick	Sejna	Leaves

SL NO	PLANT SPECIES	ENGLISH NAME	LOCAL NAME	PLANT PARTS USED
14.	Murraya Koenigii(L)(Spn)	Curry leaves	-	Leaves
15.	Camellia sinensis L. kuntze	Tea leat	Chapata	Leaves
16.	Polygonum plebium R. brown	Paly gonum	Bhasjisluk	Leaves
17.	Datura stramonium L.	Thorn apple	Datura	Leaves
18.	Phalgacanthus thrysiflorus Rox B. Nean	-	Trtaphool	Leaves
19.	Leucas indica (L)	Sweet mother wont	-	Leaves
20.	Nyctanthes arbontristis L.	Tree of sodress	-	Leaves
21.	Houtheynia cordata Thumb	-	masundx	Leaves
22.	Phyllanthus traternus weboter.	Ground embalic	Bonamilaki	Leaves
23.	Terminalia arjuna RoxB.Wt & Arn	Arjun	Arjun	Bark
24.	Citrus Lemen(L) Burm	Assam Lemon	Lebu	Leaves
25.	Ipomea aquatica	Forest	Ipomea	Leaves.

The plant extract of the medicinal plants are prepared and Sprayed on the disease plants. Fresh plant materials are throughly cleaned, Surface sterilised with ethanol and washed in sterile distilled water. The dead tissues were than grined & mixed with sterilised water adding Ime/gm tissul using pistle & mortar. The extract were first filtered through muslin cloth later through whatman No-1 filter paper. Finally the extracts were passed through seitz's filter to free them from bacterial contamination, which was taken as the standard plant extract Solution(100%). The extract were diluted by adding required quantity of sterill distilled water to obtain 20% concentration.

The extract of Leucas indica was the most effective in reducing the bacterial leafspot severity followed by Datura stramonius and Psidium guajava. The furthor intensive research on this line is required to find out the disease Specific batanical fungicide etc. The possibilities are to be explored and Scientifically documented for the farmers use.

SOIL TESTING

WORKING OF STATE SOIL TESTING LABORATORY

Government of Tripura has formulated a perspetive plan with the twine objectives of achieving self sufficiency in food for ensuring food security as well as improving the economic condition of the farming community. One of the pre-requisites for the above purpose is to provide facilities for soil testing to determine the fertility status of the cultivated field in the state to formulate appropriate recommendation for fertilizer application. This lab works as a co-ordinating and supervisory lab to all the four district mobile soil testing laboratores and one static soil testing laboratery at Udaipur.

OBJECTIVES:-

1. To make the farmers aware of their soil health.
2. To ensure appropriate use of manure and fertilizer.
3. To check wastage of manures and fertilizer.
4. To check environmental as well as soil pollution.
5. To check cause of health hazards in human being.
6. To make the farmers aware about importance of soil test.
7. To train up soil testing laboratory staff with up to date knowledge of soil Test.

Target and achievement of soil samples analysis during last five years w.e.f. 1998-99 to 2002 - 03 (Both Static and Mobile)

Year of Account	Name of District	Target			Achievement		
		State	Mob.	Total	Stat	Mob.	Total
1998-99	West	4,000	2,000	6,000	1,833	210	2,043
	South	3,000	2,000	5,000	1,939	–	1,939
	North	1,500	500	2,000	829	–	829
	Dhalai	1,500	500	2,000	683	–	683
	Total :–	10,000	5,000	15,000	5,284	210	5,494
1999-2000	West	4,000	2,000	6,000	2,178	–	2,178
	South	3,000	2,000	5,000	840	375	1,215

	North	1,500	500	2,000	1,432	–	1,432
	Dhalai	1,500	500	2,000	682	–	682
	Total :–	10,000	5,000	15,000	5,132	375	5,507
2000-2001	West	4,000	2,000	6,000	3,350	59	3,409
	South	3,000	2,000	5,000	406	–	406
	North	1,500	500	2,000	1,142	–	1,142
	Dhalai	1,500	500	2,000	2,264	–	2,264
	Total :–	10,000	5,000	15,000	7,162	59	7,221
2001-2002	West	4,500	1,500	6,000	1,562	157	1,719
	South	2,500	1,500	4,000	357	–	357
	North	1,500	1,000	2,500	1,259	–	1,259
	Dhalai	1,500	1,000	2,500	2,158	–	2,158
	Total :–	10,000	5,000	15,000	5,336	157	5,493
2002-2003	West	4,500	5,000	9,500	2233	1,904	4137
	South	2,500	5,000	7,500	22	–	22
	North	1,500	3,000	4,500	1807		1807
	Dhalai	1,500	2,000	3,500	1,582	–	1,582
	Total :–	10,000	15,000	25,000	5644	1904	7548

Achievement of S.T.L., A.D. Nagar with respect to organisation of Training course for he year 2002 – 03

Sl. No.	Name of Training Course	Types of participants	No. of Participants
1.	Methodology of soil test	L.A./A.A./A.O./A.D.	30 Nos.
2.	Awarness regarding importance of soil test	Farmers	142 Nos.

FERTILITY STATUS OF TRIPURA SOIL, ANALYSED IN STL. ARUNDHUTINAGAR.

Name of District	Name of Agri Sub-Division	Status of N (O/C)			Status of P			Status of K			Nutricnt Index		
		Low	Med.	High	Low	Med.	High	Low	Med.	High	N(O/C)	P	K.
West Tripura District	Teliamura	69.25	20.75	10.01	75.47	14.16	10.53	88.25	708	4.66	1.41	1.35	1.16
	Jirania	44.80	37.05	18.14	86.20	6.35	7.44	94.41	3.10	2.48	1.73	1.21	1.08
	Mohanpur	40.19	31.91	27.88	78.10	6.21	6.97	87.58	12.41	5.44	1.87	1.11	1.28
	Khowai	47.84	28.39	23.76	84.87	4.01	11.11	78.39	13.58	8.02	1.76	1.26	1.29
	Bishalgarh	50.21	28.34	21.31	82.66	8.88	8.32	90.18	6.89	2.79	1.07	1.25	1.12
	Dukli	53.8	23.25	23.66	86.62	8.64	4.73	92.18	4.93	2.88	1.71	1.18	1.10
	Melaghar	46.43	31.34	22.22	83.19	9.68	7.12	93.44	3.70	2.84	1.75	1.23	1.09
	Non-Block	48.30	28.81	22.88	93.22	5.08	1.69	97.45	Nill	2.54	1.74	1.08	1.05
		50.12	28.72	21.23	83.79	7.87	7.23	90.23	6.46	3.95	1.71	1.20	1.15
North Tripura District	Panisagar	50.20	26.06	23.72	76.69	11.44	11.86	84.27	0.8	7.72	1.73	1.35	1.09
	Kadamtala	52.98	29.10	17.91	85.82	6.71	7.46	82.83	12.68	4.47	1.64	1.21	1.21
	Kumarghat	72.13	21.32	6.55	91.22	5.90	2.88	59.01	29.50	11.47	1.34	1.11	1.52
	Kanchanpur	54.74	23.70	16.93	87.47	4.62	3.27	83.52	4.74	7.11	1.51	1.06	1.14
		57.51	25.04	16.27	85.30	7.16	6.36	77.40	11.93	7.69	1.56	1.18	1.24
Dhalai District	Chowmanu	47.56	31.88	20.55	86.49	6.60	6.89	78.21	8.52	13.25	1.72	1.20	1.35
	Salema	41.81	34.17	24.01	83.71	8.56	7.72	88.83	6.63	4.53	1.82	1.23	1.15
	Gandacharra	29.58	30.8	34.82	91.94	2.74	6.86	92.99	4.12	2.87	1.96	1.18	1.09
		39.74	32.30	26.46	87.38	5.96	5.15	86.67	6.42	6.88	1.83	1.14	1.20