ANNUAL REPORT

(1982-84)

RAJENDRA AGRICULTURAL UNIVERSITY, BIHAR
PUSA, SAMASTIPUR
INDIA

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PUSA (SAMASTIPUR), BIHAR

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PREFACE

Rajendra Agricultural University, Bihar, Pusa (Samastipur) is bringing out this Annual Report covering the period 82-84 when it has developed its further activities in the field of Agriculture along with other allied sciences. The main objective of the University during the year too has been to ensure optimum production in the field of Agriculture and Animal Husbandry in the State of Bihar through its educational, research and extension programmes. Work on Rice, Wheat, Maize, Millets, Barley, Pulses, Oilseeds, Sugarcane, Vegetables, Fruits, Spices, Tubers etc. earned name and fame of the University by releasing high yielding varieties and new production technologies. It has further proliferated its research programmes in different fields. Besides, departmental activities have also been ventilated through this report. Administrative, Academic and Extension activities have also been summarised.

The University is very much obliged to the Govt. of Bihar and India as also to I C A.R. for the valuable financial and other helps granted from time to time and indebted to staff members in the field and office for their co-operation and constant hard labour for achieving the tremendous amount of progress during the period of the report.

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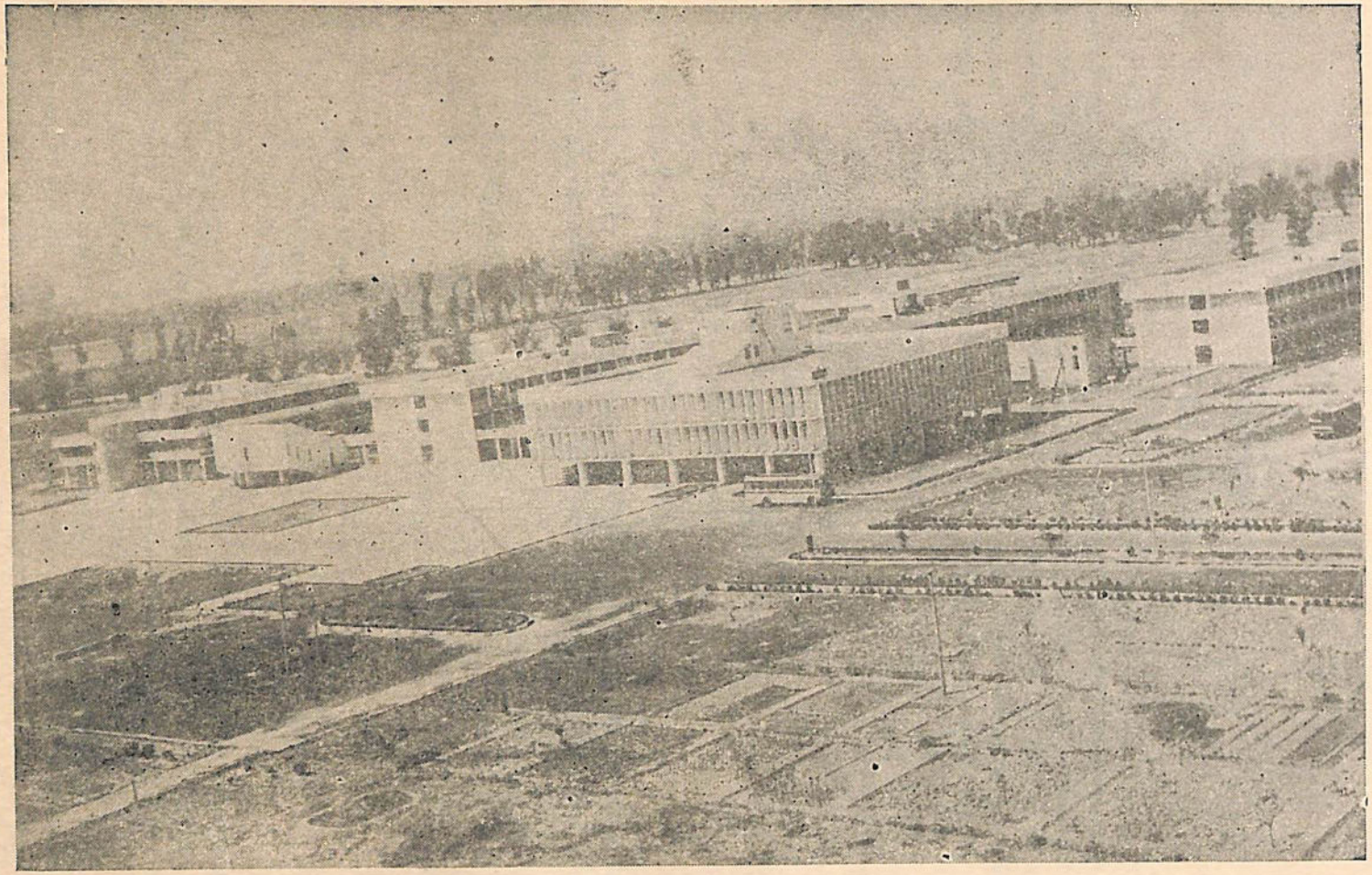

R. A. U. Pusa (Samastipur) Campus at a glance

Chapter–I

TEACHING

1.1. The Rajendra Agricultural University imparted practical and problem oriented graduate and post-graduate course programme and research in Agriculture, Veterinary and Animal Husbandry as in the past. In order to meet the further technical man-power requirements for development of the state, new graduate programmes were started and strengthened in Home Science, Basic Science and Humanities and Dairy Technology during the year under report.

1.2. The University constituted the following faculties.

1. Faculty of Agriculture
2. Faculty of Veterinary Science & A. H.
3. Faculty of Home Science
4. Faculty of Basic Science and Humanities.
5. Faculty of Post-Graduate studies.

1.3. POST-GRADUATE DEPARTMENTS

1.3.1. Under the faculty of Post-Graduate studies, the following Post-Graduate Departments are located at the University Headquarters at Pusa in Agriculture,

1. Agronomy
2. Plant Breeding
3. Soil Science & Agril. Chemistry
4. Plant Pathology
5. Entomology
6. Agricultural Economics and
7. Extension Education.

The Departments of Horticulture with fruits and Vegetables along with floriculture are located at it's Bihar Agricultural College campus, Sabour, Bhagalpur. Students for Post-Graduate programme are admitted at Pusa in the above seven subjects and in Horticulture (fruits and Vegetables) at Sabour. After completing their major course work at these two places respectively, they are distributed to Pusa/Sabour/Dholi and other places according to the problem and availability of scientists for the thesis research work. Thus, all main centres are associated with post-graduate programme in addition to graduate course.

1.3.2. The Masters degree programme in the Veterinary and Animal Husbandry Sciences are carried out at the Bihar Veterinary College campus of the University at Patna in the following subjects.

1. Veterinary Anatomy
2. Veterinary Physiology
3. Veterinary Pathology
4. Veterinary Medicine
5. Veterinary Microbiology
6. Veterinary Pharmacology
7. Veterinary Parasitology
8. Vet. Animal Nutrition
9. Animal Breeding

1.3.3. The Post-Graduate Department of Agricultural Statistics and Botany and Plant Physiology under the Basic Science Subjects are located at the main campus of the University at Pusa.

1.4. CONSTITUTENT COLLEGES

The University has the following constitutent colleges under different faculties :

(i) Faculty of Agriculture

(a) Bihar Agril. College, Sabour, Bhagalpur.
(b) Tirhut College of Agril., Dholi, Muzaffarpur.

(ii) Faculty of Vet. & Animal Husbandry

(a) Bihar Veterinary College, Patna.
(b) Sanjay Gandhi Institute of Dairy Science and Technology, Pusa, Samastipur.

(iii) Faculty of Home Science

(a) College of Home Science, Pusa Samastipur.

(iv) Faculty of Basic Science and Humanities

(a) College of Basic Science and Humanities, Pusa, Samastipur.

1 5 FACULTY MEMBERSHIP

There were 23 University Professor, 99 Associate Professors and 329 Assistant Professors in addition to other supporting staff who were engaged in teaching, research and extension education work in the University during the period under report.

1.6. LIBRARY

The University has its central Library located at Pusa. There is a collection of about 37500 books in the University Library and the University is a

regular subscriber for about 500 journals both from India and abroad. In addition different campuses of the University have got their own Libraries.

1.7. ACADEMIC COMPLEX

The main Academic Complex with College of Home Science, College of Basic Science, College of Agril. Engineering and various Departments of Agriculture are located at Pusa. The Sabour has its own magnificent old building and Dholi posses a newly constructed college building.

The Bihar Veterinary College is located at its old campus at Patna near the aerodrome.

1.8. HOSTELS

Since the University provides Resident Instruction under which it is essential for the students to stay in the hostels, sufficient hostel accomodation for about 2000 students is available at the main campus and different campuses of the University. With the establishment of new Colleges like Sanjay Gandhi Institute of Dairy Science and Technology and the College of Agril. Engineering further hostel accomodation is needed for which steps are under way.

1.9. RESIDENT INSTRUCTION.

The University imparted instructions leading to the following degrees.

(1) Degree level programme

(i) B. Sc. Ag.
(3 years/9 trimesters programme for general students and 4 years/12 trimesters programme for V. L. W.'s (in service)

(ii) B. V. Sc. & A. H.
(4 years/12 trimesters programme)

(iii) B. Sc. Home Science
(3 years/9 trimesters programme)

(iv) B. Sc. Dairy Technology
(4 years/12 trimesters programme)

(2) Post-graduate level programme

(i) M. Sc. Ag.
(2 years/6 trimesters Post-graduate programme in Agronomy, Plant Breeding, Soil Science and Agril. Chemistry, Plant Pathology, Entomology, Horticulture and Agril. Economics.)

(ii) M. V. Sc.
(2 years/6 trimester Post-graduate programme in Vet. Anatomy, Vet. Pathology, Vet. Medicine, Vet. Microbiology, Vet. Pharmacology, Vet. Animal Nutrition, Animal Breeding and Vet. Physiology.)

(iii) M. Sc.

(2 years/6 trimesters Post-graduate programme in Agril. Statistics, Botany and Plant Physiology and Extension Education.)

(3) **Ph. D. level degree programme**

(i) Ph. D.

(2 years/6 trimester Ph. D. programme in Agronomy, Plant Breeding, Plant Pathology, Soil Science and Agril. Chemistry Extension Education, Entomology, Horticulture & Agril. Economics.)

1.10. SYSTEM OF EDUCATION.

The University adopted trimester system of education in the year 1972 at Post-graduate level and in 1977 at Under-graduate level to bring parity in system of education followed at different Agricultural Universities in the country.

To streamline and systematise the trimester system of education, a detailed Regulation of Resident Instruction has been prepared which is reviewed regularly to remove short commings observed or delected during the course of implementation of the system. Necessary ammendements are effected whenever necessary.

Since the adoption of internal examination and evaluation of student's performance under this system, it has been felt that to maintain uniformity in examination and evaluation in same subjects at different institutions and by different teachers, guidelines for the examinations and evaluations are issued to the teachers so that uniformity is maintained. To maintain regular session detailed calendar of events are prepared, approved and circulated in the begi-nning of each session and efforts are made to adhere to the calendar of events so circulated.

1.11.1 ADMISSIONS

(a) Under-Graduate Programme

For admission to different Under-graduate programme of this University, a student must have passed Intermediate examination in Science with Biology or Mathematics for admission to B. Sc. Agri and B. Sc. Home Sciences courses, I. Sc. with Biology for admission in B. V. Sc. and A. H. course, and I. Sc. with Mathematics for admission in Dairy Technology. To select students for admi-ssion in these under-graduate Programmes, the University conducts a Combined Competitive Test Examination every year and the students are selected on merit based on marks obtained in the Competitive Test Examination. This examina-tion is being conducted since 1978. The following table is the indicator of suc-cessful implementation of the system for selecting students for admission.

Year	No. of students applied	No. of students appeared	No. of students provisionally selected for admission
1	2	3	4
1978	3177	3070	269
1979	3776	2374	337
1980	5480	4191	297
1981	7882	6482	289
1982	10966	9233	367
1983	13375	10668	271

The following statments shows the distribution of students so selected in different faculties for admission.

Year	Agril.	Vet.	Forestry*	Home Sc.	DT.	AE.	Total
1	2	3	4	5	6	7	8
1978	177	92	—	—	—	—	269
1979	206	117	14	—	—	—	337
1980	178	105	14	—	—	—	297
1981	174	96	19	—	—	—	289
1982	198	75	14	30	30	—	367**
1983	137	47	—	31	26	25	271

* For Ranchi Campus when it was part of this University.

** Includes students selected for B. A. U., Ranchi.

In addition ICAR sponsored candidates are also admitted to different Under-graduate programmes from different states. The following statements shows the number of students admitted to different Under-graduate programme under this category.

Year	Number of students admitted				Total
	B. Sc Ag.	B. V. Sc.	Dairy Tech.	Ag. Engg.	
1981-82	19	—	—	—	19
1982-83	6	7	—	—	13
1983-84	8	14	—	1	23

(b) 4 years (12 trimesters B. Sc. Ag. programme for V. L. W's & equivalent in service candidates),

At the instance of the Government of India and the State Government, a 4 years (12 trimesters) B. Sc. Ag. degree programme is also being conducted

exclusively for the V. L. W's and in service candidates of this University. Under the programme admissions are taken on the basis of Competitive Test conducted by the University exclusively for this category of the candidates i. e V. L W's and University employees. The University employees, who are employed as Field Overseers, Lab. Assistants or equivalent and have completed a minimum of 5 years of service & are Matriculate with Mathematics, Science or Agriculture as one of the subjects are eligible to appear at this test alongwith V. L. W's, who are nominated by the Govt. of Bihar to appear at this test. The following statement indicates the number of such candidates who appeared at the test and the number selected for admission.

Year	Candidates appeared.	Candidates selected		
		VLW	Inservice of RAU	Total
1983	244	25	4	29

1.11.2. POST-GRADUATE (MASTER'S DEGREE)

(a) Eligibility for Admission

For admission to Master's degree programmes of this University, a student must have secured 55 % marks or an overall OGPA 2.750 out of 4 000 in Bachelor's degree programme and have secured 58 % marks or an OGPA of 2.900 out of 4 000 in the subject concerned in which the student seeks admission. A student passing through trimester or semester system of education have taken a minimum credit load of 10 credits at the Bachelor's degree level in the subject concerned, in which admission is sought. While computing the credit load in a subject concerned the credit load in respect of allied subjects are also taken into consideration. In Extension Education students from both Agriculture and Veterinary streams are admitted and students admitted from Agriculture stream are awarded M. Sc. Ag. degree in Extension Education whereas students admitted from Veterinary and Animal Husbandry stream are awarded M- V. Sc. degree in Extension Education.

In Botany and Plant Physiology, students holding B. Sc honours degree in Botany with, Zoology and Chemistry combination are admitted in addition to the students holding B. Sc. Ag. degree. Students admitted from general stream are awarded M. Sc. degree In Botany and Plant Physiology, whereas, students from Agriculture stream are awarded M. Sc. Ag. degree in Botany & Plant Physiology.

In Agri. Statistics students holding B. Sc. honours degree in Statistics or Mathematics or those holding B. Sc. Ag. degree or B. V. Sc. & A H. degree are admitted. Students admitted with B. Sc. degree are awarded M. Sc. degree in Statistics and Mathematics, whereas students with the B. Sc. Ag. and B. V. Sc. &

A. H. degrees are awarded M. Sc. (Ag.) and M. V. Sc. degrees respectively in Statistics and Mathematics.

(b) Number of seats available and students admitted

Under Post-graduate programme 88 seats are available in faculty of Agriculture, 39 seats in faculty of Vet. and A. H. and 8 seats in the faculty of Basic Science and Humanities. Two seats in each discipline of Agriculture are reserved for inservice candidates and two in each discipline for I.C.A.R. sponsored candidates. Subjectwise break-up of the seats available alongwith number of students admitted in different subjects are given below :—

Faculty/subjects	seat available	No. of students admitted:
A. Agriculture		
1. Agronomy	18	17
2. Agril. Economics	10	10
3. Entomology	10	10
4. Plant Pathology	10	11 (1 nominee)
5. Plant Breeding	10	8
6. Soil Science	10	11 "
7. Horticulture	10	10
8. Extension Education	10	11 "
Total :	88	88
B. Basic Science & Humanities		
1. Botany & Plant Physiology	5	5
2. Agril. Statistics	3	3
Total :	8	8
C. Veterinary & A. H.		
1. Vet. Anatomy.	4	—
2. Vet. Pathology	4	—
3. Vet. Medicine	4	2
4. Vet. Microbiology	4	1
5. Vet. Pharmacology	4	3
6. Vet. Parasitology	4	—
7. Vet. Animal Nutrition	4	—
8. Animal Breeding	4	—
9. Vet. Physiology	4	—
Total :	36	6

1.11.3. Ph. D. PROGRAMME

Regular Ph. D. programme with course work is available in this University in all the subjects of Agril. faculty. Selection of students for admission to Ph. D. programme is made purely on the basis of OGPA of the students at Master's degree programme. Student seeking admission to Ph. D. programme of this University must have obtained an OGPA of 3·000 or 60 % marks.

The following statement indicates the number of seats available in different subjects and number of students acutally admitted during the year under report.

Faculty & snbjects	Seat available	No. of students admitted
A. Agriculture		
1. Plant Breeding	5	4
2. Soil Science	5	3
3. Agronomy	4	4
4. Plant Pathology	4	3
5. Extension Education	2	1
6. Horticulture	2	2
7. Entomology	2	2
8. Agril. Economics	2	2
Total :	26	21

1.11.4 NUMBER OF STUDENTS ON ROLL

During the period under report there were 1077 students on the rolls of the University in different disciplines as detailed below :—

Name of Programme	No. of students
(a) Under-Graduate	
1. B. Sc. Ag.	471
2 B. V. Sc.	248
3. B. Sc. (Home Science)	17
4. B. Sc. Dairy Technology	14
(b) Post-graduate programme	
1. M. Sc. Ag.	193
2. M. V. Sc.	31
(c) Ph. D. Programme	67
Total :	1077

1.11.5 Details of Post-Graduate students who were declared to have qualified for the award of M. Sc. Ag., M. V. Sc. and Ph. D. degree programmes during the period under report is given below :—

(a) Departmentwise list of students qualified for M. Sc. Ag. degree.

Sl. No.	Name of student	Title of thesis
1	2	3
	SOIL SCIENCE	
1.	Sajal Kr. Chatteraj	"Evaluation of potassium carriers and their mode of application on yield and Nutrition of maize in calcareous soil".
2.	Subodh Kr. Thakur	"Studies on the influence of permanent and Intermittent water-logging on the nature of clay minerals developed on some important soils of Bihar".
3.	Anjani Kumar Jha	"Influence of parent material on soil genesis in subarnrekha command and kharkai Basin".
4.	Shiv Shankar Prasad	"Transformation and availability of nitrogen under different management practices in water logged rice Soil".
5.	Asha Gupta	"Effect of some soil applied insecticides on the growth of sugarcane plants and microbial population in Soil".
6.	Madan Pathak	"Studies on Zinc-Mangnesium Relationship in Maize Grown in calcareous soil".
	ENTOMOLOGY	
1.	Ajay Kr. Mishra	"Bionomics host resistance and control of sweet potato weevil (*cylas formi carius*, fab.)".
2.	Ajay Kr. Sinha	"Studies on biology and biological control of gram cutwarm (*Agrotis Ypsilon* Rott) with special reference to *Microplitis smilis* Lyle and *Bacillus thuringiensis* Berliner".
3.	Ram Narayan Choudhary	"Studies on the Biology and chemical control of the Bhindi shoot and fruit borer (*Earias vitella* F) with particular reference to diffcrent newer insecticides".

1	2	3
		AGRONOMY
1.	Rajan Kumar	"Crop growth and yield performance in the two tier croping system of sweet potato".
2.	Shailendra Pd. Singh	"To study the effect of different types of soil tilth and varying levels of phosphate on the growth, yield and quality of gram".
3.	Dhananjay Nath Sharma	"Studies on Phosphate Management in Gram".
4.	Syed Ansarul Hoda	"Cultural and chemical methods of weed control in potato (*Solanum tuberosum* L.)".
5.	Gopal Prasad Thakur	"Studies on the levels of pyrites and organic manure as Soil amendments for chewing tobacco under rainfed conditions of North Bihar".
6.	Sudhir Kant Jha	"Studies on the effect of modified urea materials on increasing fertilizer nitrogen efficiency in rainfed Low Land Rice".
7.	Ram Reet Singh	"To find out the most suitable time of nitrogen appiication under different date of sowing in irrigated wheat".
8.	Ram Nath Prasad Choudhary	"Effect of Dates on sowing, levels of Nitrogen and stand establishment of Growth & yield of wheat".
9.	Amar Kumar	"Performance of different varieties of lentil (*Lens esculenta* M) under various levels of phosphate".
		PLANT PATHOLOGY
1.	Ramyan Singh	"Investigations on brown spot of Rice (*Oryza sativa* L.) caused by *Helminthosporium oryzae* Breda de Haan (*Drechslra Oryzae* subramanian and Jain)".
2.	Surendra Singh	"Studies on post harvest diseased of Potato and their control".
3.	Alok Kumar	"Studies on Rhizopus Rot of sweet potato (*Ipomoea batatas* L.) in storage in Bihar".
4.	Umesh Kumar	"Studies on wilt of lentil caused by *ozonium texanum* var. *parasiticum* and *slerotium* rolfsii".
5.	Subhash Chandra Jaiswal	"Investigations on banded leaf and sheath blight of maize caused by *Rhizoctonia solani* F. sasakii".

1	2	3
	EXTENSION EDUCATION	
1.	Ramesh Narain Mishra	"Impact of Lab to Land programme of diffusion of tobacco growing technology in adopted villages of Samastipur district (North Bihar)".
2.	Shreedhar Pati Tiwary	"Technological gaps in high yielding mustard cultivation technology in village adopted under Lab to Land programme by R.A.U., Bihar".
3.	Someshwar Singh	"A study of farmers behaviour towards modern rice technology in adopted villages of Phulwari Sarif Block".
4.	Mainak Roy Gupta	"Impact of National Adult Education Programme in changing the adoption behaviour of North Bihar Farmers".
	HORTICULTURE	
1.	Satrughan Pd. Singh	"Investigation on the effect of different levels on nitrogen and specing on growth yield and quality of OKRA (*Abelmoschus* esculentus L.) Moench".
2.	Amrendra Kumar	"Studies on the effect of etiolation and growth regulators on air layering of jack fruit (Artocarpulamb) *Helterophylus*".
3.	Om Prakash	"Heritability, covariance and pathcoefficient analysis in Bringal (*Solanum molongena* L.)".
4.	Upendra Pd. Singh	"Studies on Vegetative propogation of sapota (*Schras sapota* L)".
5.	Priyabrat Narayan Yadav	"Studies on the effect of various pre and post-harvest treatments in enhancing the edible quality and storage Life of different varieties of guava (*Psidium guajava* L.)".
6.	Jagesh Kr. Roy	"Studies in the comparative efficacy of different methods of propogation of mango (*Mangifera* indica L)".
	AGRICULTURAL ECONOMICS	
1.	Raviti Raman Mishra	"A comparative study of the level and efficiency of owner and tenant cultivation, Musahary Block, Muzaffarpur".
2.	Nagendra Kr. Singh	"A study on the Role of non-institutional credit agencies with special reference to village money-lendors (Muraul Block, Muzaffarpur)".

1	2	3
	PLANT BREEDING	
1.	Imam Md. Muzaffar	"Genetice studies on yield economics in Black gram *Vigna munga* (L) Hepper".
2.	Ajayendra Kr. Tiwary	"Variability and correlation studies in wheat (*Triticum aestivum* L.) under late sown irrigated conditions".
3.	Suraj Bali Singh	"Studies on phenotypic and genotypic variability and association among quantitative traits in promising strains of wheat (*Triticum* aestivum L)".
4.	Bibhuti Kr. Sinha	"A study of the range of variation of the factors contributing to yield in Toria (*Brassica campestris* L. var toria)".
5.	Vinod Kr. Jha	"Yield component studies in several segregating population of gram (*Cicer arietinum* L)".
6.	Sushanta Banerjee	"Genotype-environment interaction and other genetical studies in Tall Indica Rices (*Oryza sativa* L.)".

(b) List of students qualified for Ph. D. degree.

	SOIL SCIENCE	
1.	Ram Raksha Singh	"Reaction avaibility of copper in calcareous soil".
	AGRONOMY	
1.	Ram Chandra Jha	"Studies on yield and quality of tobacco (*N. rustical*) under different dates of planting and topping levels".
2.	Uma Shankar Pd. Sinha	"Synergistic effects of optimum and limited fertilization in multiple cropping".
3.	Hari Mohan Sharma	"Studies on soil plant relationship of gram (*Cicer arietinum*) at defferent fertility environment in calcarious soils of North Bihar".
	PLANT PATHOLOGY	
1.	Surendra Kumar	"Studies on Physiological specialization and control of die back of chillies caused by *colletotrichum capsici* (Syd) Butler and Bisby".

1	2	3
2.	Sachindra Kr. Sinha	"Investigations on Alternaria blight of Brinjal (*Solanum melongena* L.)"
3.	Vishnudeo Singh	"Fungi affecting soybean crops with special reference to Alternaria alternata (Fr) Keissler".

EXTENSION EDUCATION

1.	Srinarain Jha	"Characteristics, viewing behaviour and programme preference of TV viewer Farmers of North Bihar".

1.12 ESTABLISHMENT OF NEW COLLEGE

During the year 1983-84 College of Agril. Engineering was established and first batch of B. Tec. in Agril. Engineering course was admitted from Winter Trimester, 1983-84.

1.12.1 STUDY LEAVE UNDER THE FACULTY DEVELOPMENT PROGRAMME

Under this programme, the University grants study leave to the staff members with full salary support to enble them to prosecute higher studies leading to B. Sc., M. Sc. and Ph. D. degree in addition the staff members are also allowed to prosecute higher studies at their own cost for which they are granted leave whatever due or leave without pay. The following statement shows the number of such staff members granted study leave during the period under report.

Faculty	Ph.D.	U.G.	Total
Ariculture	6	4	10
Veterinary	1	—	1

1.12.2 SCHOLARSHIP AND FINANCIAL ASSISTANCE TO STUDENTS

The University provides a large number of scholarship at under-graduate level, Jr. fellowship at Master's degree level and Sr. fellowship at Ph.D. level to the students admitted in this University purely on the basis of merit. During the period under report following number of scholarships and fellowships at different levels were provided under different Heads.

Sl. No.	Name of the Programme and Scheme	Number of students benefited					
		Ag.	Vet.	H.Sc.	DT.	AE.	Total
I. Under-graduate programme							
1.	Merit scholarship	30	20	3	3	3	59
2.	Merit cum-Means UR	30	14	1	2	2	49
3.	Merit-cum-Means reserved	30	14	—	—	—	44
4.	**Other ICAR Scholarship**						
	(a) ICAR Merit-cum-Means	8	—	—	—	—	8
	(b) ICAR HRDP	1	3	1	2	—	7
II. Master's Degree Programme							
1.	Spl. Fellowship ICAR	16	—	—	—	—	16
2.	Fellowship/Assistantship	140	20	—	—	—	160
III. Ph. D. Programme							
	RAU Fellowship	2	—	—	—	—	2

RESEARCH

The progress in research during the period under report chiefly consists of latest improvement in the different components of crop and animal production technologies which would serve the purposes of the farmers of this State for their different farming situations and resource endowments vis-a-vis their needs of increased farm and animal production. Identifying suitable germplasms for effective breeding programmes, selection of promising lines and finally locating a potential strain of a crop formed the main objective to evolve situation specific crop varieties which were further studied in respect of their response and reaction to fertilizers and irrigation scheduling as well as insects and pests incidence. The valuable findings on soils dificient in Zinc, Copper, Magnession and Boron are also reported for different Bihar soils. The fertilizer schedule for economic yield of rice in young alluvial soils has been developed and reported.

Answers to some of the problems of seed germination vis-a-vis the successful plant growth have been worked out.

RICE :

BEREDING

(a) Germplasm : A total number of 2768 germplasms were grown for evaluation and cataloguing. 89 new collections were made.

(b) Breeding material : 80 fresh crosses were made. Breeding material (F_1 to F_6) from 398 crosses were grown and 2765 selections were made for further evaluation. Plants having good plant type and white kernels were selected from Janaki mutants.

(c) Genetic studies : In the hybrid rice programme, 13 restorers, 5 partial restorers and 13 maintainers were identified. A new male sterile line, Patna CMS-1 has been developed.

(d) Varietal evaluation : A total of 66 trials State (25), AICRIP (16), IRTP (11) and Regional (14) were conducted at different rice stations/centres, in which a total of 2992 entries : State (605), ICRIP (563), IRTP (898) and Regional (926) were tested. The important findings of these trials are as follows :

A. Irrigated Lowland Situation

(i) Summer season : IET 416, IET 3279, IET 3116, Kiran, ES 21-1-2 were found to be promising. Kiran and IET 3116 with 35-45 q/ha yield potential had seed dormancy of about 10 days.

(ii) Kharif season :

(a) Early duration : IET 7278, BPT 1235, BR 109-74-2-2-2 with a yield potential range of 30-40 q/ha were found to be promising. In the very early group, promising selection, ES 1-2-3, ES 21-2-1 and ES 28-2-1 were identified for post flood planting condition.

(b) Medium duration : IET 6263, BIET 1009, IR 13540-56-32-1, UPR 254-85-1 and UPR 79-17 with a maturity period range of 130-140 days and an average yield potential of 50 q/ha were found promising. BIET-1009 has been doing extremely well at the national level also and has been identified as one of the top 2 entries in the AICRIP trials for the last 2 years.

(c) Late duration : IET 9830-26-1, IET 9830-26-1, IET 5656, IR 2071-586-5-6 (IR 42) and IET 7049 mature in 140-150 days, have improved plant type with the yield potential range of 50-55 q/ha Entries RAU-SBS 565, RAU-SBS 566 and TCA 48 also performed well when 60 day old seedlings were transplanted.

B. Rainfed Lowland Situation :

(a) Shallow and Intermediate Rainfed (Rainfall upto 50 cm) : RP 1451-24, TCA 48, RAU 83 and RAU-SBS 80-565 have done well under rainfed lowland condition yielding 35-45 q/ha.

(b) Semideep Rainfed (Rainfall 50-100 cm) : Barogar-5, KLG 146, NC 62-10, BIET 820, Jaladhi-2 CN 540, Tilak kachari and NC 487 177 possess tolerance to water logging and submergence, with the yield potential range of 20-30 q/ha.

(c) Deep Water Situation (above 100 cm) : TCA-268, TCA-4, IET 9006, IET 9009 and IET 9010 and IET 9011 were identified promising under deep water condition.

(d) Saline-Sodic Situation : IET 3279, IR 4568, IET 7903, IET 7336 and IET 7587 were found to be tolerant to saline-sodic condition.

C. Scented Rice :

RAU-SBS-80-581 and IET 8575 have fine grain with good aroma. No entry in dwarf group had the grain quality of Basmati 370 (37.90 q/ha), though IET 6288 (38.78 q/ha) yielded better.

D. Breeder Seed Production :

Breeder seed of CR 44-35 (3.76 q), Pusa 2-21 (3.34 q) Sita (9.35 q), Mansuri (1.02 q), Jaisaria (0.53 q), Pankaj (2.16 q), Rajendra Dhan 201 (2.16 q), Janaki (3.00 q) and Pusa 33 (3.00 q) were produced during the year under report.

E. Release Proposal :

Release proposals of BG 90-2 and UPR 238-42-2-3 were initiated. BG 90-2, a high yielding resistant to BS matures in 130-135 days. UPR 238 matures in 115-120 days with a good yield potential and resistance base.

AGRONOMY

The total agronomical trials duly conducted were 4 in summer and 14 in kharif season on different aspect.

In rainfed lowland situation, the neem cake coated urea applied to paddy soils caused higher yield compared to simple urea, for all paddy varieties, in general The tall varieties, TC 808, TCA 807 and IET 7970 were found superior to control, BR 34 and Mansuri, with maximum response limit at 40 kg N/ha.

In scented rice varietal trial RAU-SBS 80-581 yielded higher than standard check BR 9 and Sugandha but they all had a maximum N-response upto 40 kg/ha.

In mid-duration varietal trial, BR 51-46-5 and BIET 1009 outyielded standard check, Sita with the common maximum N-response up to 120 kg/ha.

In short duration varietal trial IET 6148 and UPR 238-42-2-3 outyielded the standard check CR 44-35 with their tolerance to zink difficiency.

In rainfed lowland situation, urea supergranules (USG) proved to be the best source of nitrogen giving highest response to applied nitrogen. In direct seeding condition, USG applied at 8-10 cm depth after first rainfall gave highest yield. In dual cropping with Azolla, inoculation @ 1 ton/ha added 30 kg of N/ha.

In an experiment to evolve a better rice based cropping system, it was observed that much of P & K can be saved if rice is grown after wheat, in particular, in which the full recommended dose of P and K was applied previously.

In herbicidal trial, 'Saturn' and 'Mechete' @ 1.5 kg ai/ha had greater weed controlling effect as compared to all other test herbicides.

PHYSIOLOGY

(a) Photoperiodic sensitivity :

In the screening test of 115 promising rice varieties for their reaction to Photoperiod, 75 varieties were found photoperiod sensitive, 23 were photoperiod insensitive and 17 were weekly photoperiod sensitive.

(b) **Thermosensitivity :**

Of the 62 rice varieties tested in this regard, the germination in February-1 sowing took place after 12 days, that on February 15, March-1 and March-15 sowing was satisfactory. Flowering duration of Feb.-5 and March-1 sowing was almost equal to that of March-15 sowing. Hence, according to flowering duration, summer sowing may be done after February-15.

(c) **Waterlogging :**

20 entries were tested to this effect. The entry, CR 143-7, CR 330-40-3, BIET 724, BIET 821, CN 499-160-2-1, CN 499-160-13-6, CN 506-147 2-1, NC 492 and Tilakkachari were relatinly superior with better yield as compared to local check BR 34.

(d) **Potential grain filling :**

Studies on assessment for potential grain filling with 2 early, 2 medium and 4 late duration varieties suggested that late duration varieties showed better index than rest of the varieties.

(e) **Biofertiliser :**

In the biofertilizer trial, the field inoculation of Azolla @ 500 kg/ha as dual cropping and BCA @ 10 kg/ha gave yield comparable to that obtained from 30 kg N/ha Azolla multiplication under field condition was possible throughout the year.

PATHOLOGY & VIROLOGY

(a) **Effect of sowing date :**

Late sown varieties in general, suffered more from Bacterial Blight (BB) as compared to early sown, Pankaj (late sown) suffering most both in disease intensity and yield.

(b) **Disease development and Nitrogen management :**

The disease intensity was observed to be positively correlated with the nitrogen dose upto 120 kg/ha in most of the rice varieties, except IR 4565 and BR 4. Addition of Potash reduced the disease intensity. Split application of N at base tillering and panicle initiation reduced the disease intensity and increased the yield

(c) **Screening :**

In SSN summer, the entries IR-SB 163-81, UPR 245-65-2-1, RAU 3004-4-3 and TNAUD 103 were resistant under both natural and artificial screening trials against BB, and so were BR 51-28-2, BIET 1155, 1156, 1157 and IET 7970 at Patna and Pusa.

In SSN deepwater and lowland rice, the entries, RAU 21-35-3-5, C 62-10, CN 540, TCA 177, TC 12 were resistant against BS and BB both at Patna and Sabour.

(d) Evaluation of released and promising rice varieties against BB:

Radha with reaction of 1-6 against BB yielded 41.98 q/ha, IR 54 with 3-6 score yielded 42.53 q/ha and RP 2151-192-9 with 5.6 score yielded 43.56 q/ha.

(e) Chemical control :

Seed treatment and seedlings dip with plantomycin and two sprayings with paushamysin mixed with copper Oxychloride were found to be effective in reducing BS. Further, potassium permangnate (3 X) and Mercoer (30) also reduced BB severity Bavistin & Foltaf were found to be effective fungicide in controlling sheath rot disease Bavistin and Vitavex were found to be effective in seed treatment by reducing the loss of microflora and increasing the germination of seeds.

(f) Virological trials :

In the insecticidal trial for the control of Rice Tungro Virus (RTV), three soil application of Carbofuran (1.25 kg/a.i./ha) gave highest yield (48.20 q/ha) against the control (36.04/q/ha), and so was the results with other insecticides.

The field experiment on RTV control by plant spacing resulted into maximum yield at 15×15 cm and 15×20 cm spacing by three varieties having differential susceptibility to RTV viz., Pankaj (susceptible), Rajendra Dhan 201 (tolerant) and Saket-4 (immune). Bokol, a highly susceptible variety to RTV, yielded 30 50 q/ha at 20×20 cm spacing.

ENTOMOLOGY

Three years on the population fluctuation of major insect pests in relation to late variety, Pankaj have shown that the population/infestation of insect pests increases on every successive dates (15th May sowing revealed least pest population and highest yield 63 12 q/ha).

In an insect pest control trial on rice, out of nine insecticides, Hostathion 40 EC @ 0 5 kg a i /ha was found to be most effective in increasing the yield.

The application of Carbefuron granules 3 G @ 0 75 kg, a.i /ha just before transplanting and need based foliar spraying of Ekalux 25 EC @ 0.50 kg a i./ha resulted in low pest population and increased yield (34.03 q/ha).

SOIL AND WATER MANAGMENT

There is saving of 28 cm of irrigation water in irrigation in rice is given after one day of disappearance of ponded water as compared to continuous submergence of 5±2 cm throughout the rice growth period, instead of 3 to 5 days interval of irrigation watering, for higher rice production.

Puddling by different implements have equal effect on rice yield and so was on leaf area and ET loss.

Four ploughings by M. B. or desi plough is preferable to only two ploughings for reducing weed population significantly in rice field

SOIL TILLAGE (AGRIL. ENGG.)

The different bullock-drawn levellers for rice fields did not show any significant effect on rice yield differential.

SOIL SCIENCE & AGRIL. CHEMISTRY

Soil Physics :

(i) Adding rice husk @ 10 t/ha as bulky organicmanures in having rice-soils increased the rice grain yield by 10 % over the control.

(ii) In calcarious paddy-soils, a single submergence of the rice-field at 5±2 cm for about 10 days at any of the physiological growth stage was found to be beneficial to the crop.

(b) Soil Micronutrient :

Screening of improved rice genotype for tkeir susceptibility to iron stress in calcarious soils indicated that tolerant varieties contain higher amounts of Chlorophyll 'a', 'b' and total Chlorophyll of phenanthroline reactive iron as compared to the susceptible ones.

(c) Soil Test Crop Response :

The fertilizer schedule per hectore for economic yield of rice in young alluvial soils were estimated as 86:65:34 for N:P:K.

Significant response to 40 kg k_2O/ha was obtained for rice in calcarious soils of Bihar. However, rice as one amongst other cereals showed lowest buildup of soil potassium.

(d) Soil Chemistry :

(i) Nutrient transformation in water logged rice soils indicate that Ec and PCO_2 values of soil solutions were highest at 10 DTA (Days After Transplanting), A simultaneous accumulations of NH_4–N and decrease in NO_3–N occurs with the increase in the duration of submergence. O sen P values in the sharply at DTA followed by a decline. DTPA–Z_n values decreased progressively and DTPA–F_e and M_n increase continuously between 10 to 50 DTA.

(ii) Nitrogen transformations in waterlogged rice soils under the combined use of bio-organic and chemical fertilizers, indicate that bulk of the soil-N was present in hydrolyzable and non-hydrolyzable forms. Multiple regressions

analyses between different pools of soil-N (NH_4-NO_3, Hydrolyzable and non-hydrolyzable-N) with yield, content and uptake of N by rice show high prediction value.

(iii) Studies on Fractionation of Zn in rice soils treated with Zn-fulvale indicates that a major fraction of the zinc applied in the form of zink chelate is present in the soil in potentially available forms. Zink chilate, therefore, are expected to be more efficient sources of fertilizer. Date analysis has further shown that Zn content, organic carbon and pH exert overriding influence on the forms of Zn that are potentially available of the crops.

(e) Soil Microbiology :

(i) The study of residual effect of the % Azotobcater, Azospirillum and phosphobacterin inoculation in the rice crop showed significant build up of available N at tillering, PI and maturity stages. Available P_2O_5 at harvest was obtained due to microbial inoculation. Combined inoculation of Azospirillum and Phosphobacterin was effective in enhancing total N uptake.

(ii) Algal inoculation alone or with fertilizer nitrogen increased the straw and grain yield of rice. Build up of available N, P_2O_5 and Ca in soil was associated with decrease in K, M_g and N_a with algal inoculation. In cultivator's field (Bhagalpur), the algal inoculation economised the N-requirement of rice by about 40 kg/ha.

(f) Biochemistry :

The residual effect of some commonly used biocidal chemicals at different levels of N on rice indicate that Aldrin increased the straw yield by 20 % over control. B.H.C. and Heptachlor did not have significant effect on rice yield.

CROPPING SYSTEM

Experiments on cropping sequences and their fertilization with various base crops have been initiated to develop potent cropping sequence for sustained economic production and consistent with the long range management of soil fertility. Rice as a base crop in such experiments have shown the following results.

(i) The crop sequence rice (Pankaj)—wheat (Sonalika) recorded the highest net income (Rs. 8385.00/ha) followed by rice (Sita)—wheat (Sonalika) and rice (Sita)—Rai (Varuna) with the net income of Rs. 7991.00 and Rs. 7549.00 /ha respectively.

(ii) Maximum rice equivalence was obtained with Moong NP 28 as mixed crop to rice as against Moong NP 18 and NP 23 as alternative mixed crop to rice.

(iii) In the rice + moong mixed cropping, rice yield was found to have been increased if the moong plants, (after the pods were picked up) were allowed to decompose in Sita than uprooting such moong plants altogether.

WHEAT :

BREEDING

Wheat breeding in the University has been so oriented as to meet the needs of three agro-climatic situations, namely rainfed timely sown, irrigated timely sown and irrigated late sown and the results obtained in this regard are presented below in that order.

(a) Rainfed Timely Sown :

Of the 44 newly evolved varieties of wheat tested in the State trials under rainfed conditions, seven were found to be significantly superior to the check, C 306 (11 96 q/ha) in respect of their yield potential. These seven varieties with their per hectare yield are : BR 366 (22.83 q), BR 33 (19.38 q), BR 3505 (17.93 q), BR 277 (17.57 q), BR 3153 (17.57 q), BR 3502 (17.80 q) and BR 324 (16.40 q).

BR 3016 (17 66 q/ha) and BR 3173 (13 99 q ha) after being screened in the all India Initial Co-ordinated Trial, were promoted to Uniform Regional Trial.

BR 277 (20.44 q/ha) on being screened through the Uniform Regional Trial, was found to be at par with the standard check, C 306 (19.72 q/ha).

Five RAU varieties : BR 366 (16 28 q/ha), BR 331 (16 21 q/ha), BR 3501 (14.70 q/ha), BR 339 (11.14 q/ha) and BR 324 (14.40 q/ha) have been promoted and selected by All India Wheat Workshop to include them in the Initial Evaluation Co-ordinated Trial.

(b) Irrigated Timely Sown :

280 germplasms were grown to be used in hybridization programme. 165 single crosses were made for high yield and disease resistance—127 homozygous lines were bulked for further testing, from out of the various segregating generation.

In the State trial with 139 varieties evolved in the RAU, BR 354 (33.70 q/ha) and BR 356 (28.26 q/ha) were found to be significantly superior to the better check HP 1102 (22.62 q/ha).

BR 326 (32 48 q/ha), a promising wheat variety has been retained in the AIURT 1983-84.

Five other RAU varieties : BR 552 (25.72 q/ha), BR 46 (19.57 q/ha), BR 356 (28.26 q/ha), BR 347 (24.64 q/ha) and BR 3505 (34.06 q/ha) were promoted and selected by the All India Wheat Workshop to include them in the Initial Co-ordinated Trial 1983-84.

(c) Irrigated Late Sown :

Three wheat varieties : BR 333, BR 3518, BR 318 in All India Co-ordinated Trial, one BR 2142 in the Initial Evaluation Trial; and two BR 3087 and BR 2044 in the Uniform Regional Trial were entered and studied.

In the Initial Evaluation Trial, BR 318 (45.02 q/ha) was significantly superior to both the checks HP 1209 (32 99 q/ha) and Sonalika (34.68 q/ha).

In the Uniform Regional Trial (Sabour) BR 3087 was (15.83 q/ha) at par with Sonalika (17.41 q/ha).

Four RAU varieties BR 348 (20.29 q/ha), BR 354 (33.70 q/ha), BR 3142 (18.30 q/ha) and BR 3177 (21.01 q/ha) have been promoted to the All India Initial Co-ordinated Trial 1983-84

AGRONOMY

Wheat varieties HUW 202, HUW 205, HUW 201 and HUW 213 yielded at par giving per hectare yield of 44.72 q, 43.06 q, 42.44 q and 41.41 q respectively.

Under normal date of sowing (Nov. 18) HUW 202 and HUW 205 gave yield of 50.31 q/ha followed by HUW 213 (49.40 q/ha).

Wheat variety HUW 206 was identified for timely sown for irrigated high fertility conditions, while HUW 213 and K 802 were identified for late sown high fertility irrigated condition of North Eastern plain zones, including Pusa and Sabour.

Wheat variety C 306 was observed for best performance for all dates of sowing; October 21, November, 12 and November 25 under rainfed condition, BR 277, however, showed good performance (29.32 q/ha) when sown on Nov. 12 next to C 306 (32.80 q/ha).

Response of wheat to K was found non significant.

Under different crop geometrics, like cross sowing (47.55 q/ha) ship row (47.77 q/ha and paired row planting (48.88 q/ha) were observed to have an edge over normal sowing (43.33 q/ha).

Under Nov., 22 sowing the response of wheat to nitrogen was significant upto 80 kg N/ha (45.00 q/ha). However, under late sown conditions, wheat

sown on December, 7 required 120 kg N/ha to produce the same level of yield (46.54 q/ha).

PATHOLOGY

Seed treatment and spraying the foliage did not favour in controlling the foliage blight in wheat. However, Bavistin helped in reducing the disease incidence and increasing the yield by single seed treatment.

Very slight infection of brown rust in the high yielding resistant wheat varieties were observed.

ENTOMOLOGY

Among the insecticidal trial, phosphamidon, dimithoate and demeton-S methyl all @ 500 g a.i./ha were found to be highly effective, the former being the best, which minimised the infestation, maximised the yield and gava a net return of Rs. 2 61, Rs 2 41 and Rs. 2.55 respectively per rupee investment.

SOIL AND WATER MANAGEMENT

(a) Water Fertilizer Interaction :

Significant increase in wheat yield was observed due to irrigation upto IW/CPE=0.8 (three irrigation of 6 cm each) for the 1st two years, while during the third year (1983), response was noticed upto IW/CPE=1-0 (4 irrigation of 6 cm each). The irrigation between irrigation and nitrogen was significant at irrigation at IW/CPE=1.0 and 100 kg N/ha, resulting in maximum yield of 45.00 q/ha.

(b) Irrigation scheduling :

(i) The irrigation scheduling for wheat has been verified for wheat (Madhepura) for actual IW/CPE ratio and was found to be valied at 5% level of significance. Such schedule would help the canal authority in planning canal operation for optimum utilization of irrigation water.

(ii) Experiment on scheduling of irrigation in late sown wheat (second half of December) in sandy loam calcarious soil of North Bihar indicated that only two irrigation at 5 cm each, first at CRI and second during the period till flowering stage, are optimum, irrigating twice or thrice or four times resulted in the yield without much difference, average yield being 22 q/ha. Spraying of 1% Sodium Benzoate at full vegetative cover could not help the moisture recovery due to delay in irrigation.

SOIL SCIENCE & AGRIL. CHEMISTRY

(a) Micronutrients :

Six high yielding wheat varieties were screened for their relative susceptibility to Zn deficiency in calcarious soil. The optimum Zn level for these varieties

appeared at 5 kg Zn/ha. The variety which gave maximum percent response to grain yield was classified as most susceptible and one which had least response was rated as least susceptible to Zn dificiency, as follows :

HP 1102>	UP 262>	HP 1209>	HUW 12>	NP 852>	Sonalica
(25%)	(23%)	(15%)	(8%)	(4%)	(1%)

(b) Microbiology :

(i) The inoculation of wheat with Azotobacter or Azospirillum or Phosphobacterin either alone or in combination failed to cause significant increase in the yield of the crop over uninoculated control. However, Azotobacter inoculation above increased the grain yield by 16.20% over the control.

(ii) No deleterious effect of insecticides and weedicides on soil microflora and yield of wheat crop was observed.

(c) Soil Physics :

(i) With a view to develop a technology for the improvement of soil physical condition of heavy paddy soil for the cultivation of rabi crops, it was observed that the yield of wheat (a rabi crop) can be increased due to the addition of bu ky organic manures in kharif rice soils.

(ii) Increasing the compactness of seedbed of heavy soils, the germination of wheat seed was considerably high, eventually giving higher wheat yield.

(iii) Mixing bulk organic manures into deeper layer of soils and also loosening it upto 45 cm depth increased the wheat yield and physical conditions of the Tal Land Soils.

(iv) Studies on the leachate movement in terraced land (conducted in terraced lysimeters) at Pusa, indicated that there was no significant difference in wheat yield from one terrace to another. However, the concentration of Na^+, K^+ ($Ca^{++} + Mg^{++}$), HCO^-_3 have shown increasing trend when the leachate moved from topmost lysimetric plots to the subsequent lower elevation plots. This shows the tendency of salt accumulation in the top layers of lower terraced land caused by the sub-surface runoff from the upper terraced land.

BARLEY

Breeding :

Under rainfed condition four RAU varieties : BR 3148 (19.75 q/ha), BR 3147 (19.32 q/ha), BR 3145 (17.39 q/ha) and BR 3153 (16.12 q/ha) were found to be at par with the superior check Ratna (19.20 q/ha).

Under irrigated condition, BR 3138 (21.49 q/ha) and BR 3156 (18.66 q/ha) were found to be at par with the standard variety Jyoti (1848 q/ha).

In the Uniform Regional Trials of Hult less barley the newly identified variety, Karan 19 maintained its superiority under rainfed (14.98 q/ha) as well as irrigated (18.24 q/ha) condition and none of the varieties could outyield it.

Pathology :

In screening various varieties/lines etc., the rusts are not the major problem because of mild form infection in all the varieties but the major problem is due to Leaf Blight for which the seed treatment & spraying trials are under progress.

Entomology :

The insecticidal trial against aphids in Barley revealed that the protected crop recorded higher yield over unprotected one. Maximum avoidable loss was recorded in Karan 19 to be at 17.03%.

MAIZE

Breeding:

Rabi :

Variety M 13 yielded 46 50 q/ha and it was 12 69 higher over Lakshmi (Dholi) and 15.00% higher over Decan 103 (Sabour).

The medium duration composite MCU 314 yielded highest i. e. 63.61 q/ha, in 1982 and 55.76 q/ha giving 27.6% higher yield over the best check in 1983.

The early variety G 25, like last year's best yielder, yielded 37.08 q/ha (Dholi) and 57.29 q/ha (Sabour), this being 36.9% and 38.2% higher in yield, respectively, over Diara Composite.

Kharif :

MCU 508 was identified as a superior early maturing composite, maturing in 78 days and yielding 23.30 q/ha, which was 37% higher over Diara Composite.

The experimental hybrid (CM 400×CM 300)×EC 123355 matured in 87 days eight days earlier than GS-2 and yielded 39.94 q/ha only 7.5% more over GS-2. The experimental composite ESC VII matured in 84 days, 7 days earlier than Composite Suwan and yielded 35.68 q/ha as against 32.95 q/ha of Composite Suwan. These two varieties belong to the Medium Maturing group.

Under a bit high maturing group was Composite J 660, which matured in 84-88 days yielding 38.77 q/ha (Sabour) and 21.81 q/ha (Dholi), this giving a 55% and 21% increase respectively over the check at these two places.

M 9, a late maturing composite, maturing in 92 days, yielded 43.83 q/ha, against Composite Suwan (39.10 q/ha).

Agronomy :

Rabi :

Lakshmi Composite at 180 kg N/ha with a plant population of 90,000 yielded 85.73 q/ha at Sabour and 78.94 q/ha Dholi.

Splitting of N in maize proved better than single whole-dose application. Maximum yield of 50.87 q/ha (grain) was obtained when N was applied @ 15 kg/ha at showing, 90 kg/ha at knee height and 15 kg/ha at tasseling stage (a total of 120 kg N/ha).

Kharif :

Maize with Groundnut as intercrop gave maximum return as compared to Maize with either Moong, black gram or Soyabean as inter crop. Sowing maize and Groundnut together resulted in high return than the two crop sown at different dates

The early maturing composite MCU 50 yielded 28.98 q/ha at 45 kg N/ha and 32 05 q/ha at 90 kg/ha (Sabour).

For weed control in maize, Atrazin @ 0.50 kg a.i./ha as pre emergence treatment was most effective, helping achieve grain yield of 33.75 q/ha, as compared to 2-4-D, Netrofen and hand weeding.

Pathology :

Three year data have confirmed that Composite Lakshmi has minimum loss 11.2 to 18.4% (in grain yield due to rust, which was maximum 33 to 36%) in early Composite Diara and Hunius, when sown in November. Under late sown condition, this loss due to maize rust was more in early varieties and less in full-season varieties.

190 germ plasm were screened for resistance against *H. maydis* and *H. turcicum* under artificial inoculated condition. Five entries were found to be resistant against *H. maydis*, and several others were found to be resistant to *H. turcicum*.

In a chemical treatment trial, Klorosin 0 45% was found significantly effective in reducing Bacterial Stalk Rot to the extent of 12%. Bleaching powder reduced the incidence to 17%.

Entomology :

The larvae of Climbing Cut Worm in maize got parasitized by *Apenteles* sp under field condition, the maximum parasitization of larvae (15%) being during January.

Five trials on 55 germplasms, being screened against Climbing Cut Worm, showed their tolerance quite fairly.

Two applications of Carbryl and one application each of Carbofuran 3 G and Quinolphos 5 G, on maize, indicated that all treatments were equally effective in controlling the incidence of Stem borer : Quinolphos being more economical.

Of the 175 germplasm, 30 showed least resistance against stem borer infestation, under natural condition.

Nematology :

(i) The study of 105 soil samples collected from Rhizosphere of healthy as well as unhealthy maize plants, revealed the Nematodes population varying from 382 to 1380 per 500 gm of soil. Some of the important nematodes indentified were Helicotylenchess, Hoplaminus, Pratylenchus and Meloidogyne.

(ii) Interaction of *Hoplolaimus indicus* and Stalk Rot organism, *Erwinia carotovora* showed no rotting of maize plants when either nematode or bacterium was inoculated in soil, but when bacterium was inoculated by hypodermic syringe method hundred per cent rotting was recorded. 20% and 40% rotting were noticed with treatments where nematodes and becterium were inoculated together and bacteium was inoculated on injured roots respectively.

Water Fertilizer Interaction :

Significant difference in maize yield due to different levels of irrigation and nitrogen was recorded. The response of irrigation was noticed upto IW/CPE =1 at Pusa and IW/CPE=0.6 at Madhepura. Nitrogen response upto 150 kg/ha was recorded. Four irrigations of 6 cm (IW/CPE=1.0) with 150 kg/N/ha resulted in maximum grain yield (44 q/ha) whereas only 11.00 q/ha yield was recorded with two irrigation of 6 cm each without any N.

Water Mulching Effect :

Mulching and Zink application at different irrigation levels, in winter maize, caused increased soil temperature of 1 to 3°C, which improved the crop growth and yield, significantly. Winter maize yield can be increased by 30% due to mulching to the extent of @ 40 q/ha, as compared to only 30 q/ha without mulching under similar condition. Application of Zn SO_4 @ 25 kg/ha significantly increased grain yield at different irrigation level.

(c) Drainage :

(i) Combination of surface and subsurface drainage resulted in maximum grain yield (32 q/ha) followed by surface drainage (27 q/ha) as compared to no

drainage (25 q/ha) in Maize. Conventional sowing method and earthing up of plants at 30 days was superior to other method, with no interaction effect of sowing method and drainage pattern.

(ii) The maize yield reduced, (maximum) due to 4 days continuous storms of 10 cm water at the knee height, to the extent of 40 to 60%. Even 2 to 3 days storm at this stage and 3 days storm at flowering stage reduced the grain yield considerably (25 to 38%). At flowering and grain formation stage, however, a 10 cm water for one day storm can be tolerated without any substantial reduction in yield.

Soil Physics :

In winter maize, use of sugarcane trash mulch @ 12 q/ha reduced the weed population, economised irrigation and significantly increased the grain yield by 10 q/ha over control.

Soil test crop response :

(i) Fertilizer schedule for economic yield of maize (gram) was estimated, for young alluvial calcarious soils, to 84 kg N : 66 kg, P_2O_5 and 41 kg of K_2O for one hectare crop.

(ii) Maize responds well to Potash (40 kg/ha) in calcarious soils of Bihar, with strong build up of soil potassium.

(iii) Maize removes 10 to 101 kg N/ha & 4-56 kg K_2O/ha from maize soil.

Micronutrients :

Two foliar sprays of Zn chelate (0.25%) solution and 0.5% Zn sulphate solution produced grain yield response of 14.4 q/ha and 11 q/ha respectively. A grain yield responsing 11.5 q/ha was recorded due to foliar spray of 1% Fe-chelats solution against 3.4 q/ha obtained by 2% $F_e - SO_4 - 7 H_2O$ solution spray. This shows that chelated micronutrients are far better than their inorganic salts.

Mineratory and Pedology :

The kinetics of release of K showed that second rate of release multiplied by moisture saturation percentage was significantly correlated with the uptake of K by maize. Among the different extraction procedures tried, 6 N H_2O_4 extractable K was positively correlated with its uptake by this crop.

Agril. Engineering :

One pipe type hand maize sheller has been developed and released for general use by the farmers.

Cropping System :

(i) Maize-Wheat-Moong and Maize-Toria-Wheat were found to be potential cropping sequences with a net income of Rs. 9220/- and Rs. 8560/- ha, respectively.

(ii) Sowing of maize and groundnut as intercrop on the same day was better than staggered sowing of either of the crop components.

PULSES

Breeding :

Arhar :

Four early (130-155 days) lines, screened from the breeding materials : DA-6 (12 5 q/ha.), DA-7 (13.8 q/ha), DA-8 (14.6 q/ha) and DA-9 (10.6 q/ha) outyielded the check, Prabhat (9.4 q/ha) significantly. Two such breeding materials of late durations : DA-13 (26 5 q ha) and DA-15 (26.7 q/ha) yielded higher than the check, Bahar (24.8 q/ha; Dholi). These six varieties have been included in the Coordinated Varietal trials.

Coordinated Varietal Trial with medium maturing lines conducted at Patna & Sabour came out with differential results. While at Patna, MA-162 (17.6 q/ha), Patn. A-51 (16.2 q/ha). PDA-3 (15.7 q/ha) and MTH-1 (14.7 q/ha) outyielded check, BR-65 (9.0 q/ha), at Sabour the check BR-65 (12.5 q/ha) excelled other significantly.

Gram:

The promising advance generation lines : DG 82-19 (Himax WR-31) and DG-21 (C 214 × H 208), yielding 28 9 and 27.8 q/ha as against the check, Pant G-114 (26.6 q/ha) were included in the All India Coordinated Testing programme.

Amongst 18 other promising lines, 10 with their yield range of 35 5 to 40 q/ha and 3 others with their yield differential of 31.2 to 42 0 q/ha had significant yield superiority on the check, Pant G-114 (26.6 q/ha) These lines are again put to further yield-potential confirmation through Station trials (Dholi). At Sabour, 8 potential entries from the previous trials have been retained to be compared against the 30 superior advance generation lines : 9 of them with their yield range of 29 8 q/ha to 30.5 q/ha against the check, C 335; 10 others with their yield range of 26.4 to 31.5 q/ha against the check C 235 and still 11 others with their yield differentials of 25.4 to 31.5 q/ha. against the check, BR-77.

BG (M) 425 and BG (M) 462 both from IARI, New-Delhi, recorded highest yield C (31 5 q/ha), in the Coord. Initial Evaluation Trial, at Dholi, almost at par with those of GG 602, GNG 158, C-235 (check) and GB 806 and BG-279.

The RAU entry DG 82 19 (Late sown) significantly outyielded (18.3 q/ha) others.

In the Coord. Varietal (Dholi), BG (M) 413 yielded maximum (35.4 q/ha), at par with BG 249, 1000.29, BG 256 and DG 77-32. At Sabour, R. S. 44 (27.9 q/ha) recorded maximum yield which was at par with check BR-77, RSG-130, Phule-5, BG (M) 413, RSG-6, GF-734, 1000-29, BG-249 and BG-240, while at Patna, the check C-235 was the top yielder being at par with K-902, BG-247, BG-225, H-78-18, BG-240 and BG-249.

Ninetythree promising Kabuli Lines have been selected for further evaluation at Sabour.

Peas :

Seven promising advance generations recorded the yield range of 17 3 to 21.9 q/ha, which in terms of percentage was 4.2 to 31.9% higher than the check T-163 (16.6 q/ha) in a station trial; while in other trial another 5 lines showed their yield diffrentials of 15.2 to 19.4 q/ha, i. e. 4.8 to 33.8% higher than the same checks, T-163 but yielding 14.5 q/ha. These 12 lines stand to be reevaluated.

In the coordinated varietal trial, DMR-12 and Pant P 4 gave highest yield (119 q/ha). Varieties HPF-5, Pant-P 5, DMR-10, DMR-11, DMR-8, KPMR-84, HUP-1 and VIP-1 were other top significant yield performers.

Amongst the early lines screened for yield, 6 such lines were identified which matured a fortnight earlier and yielded, 16.7 to 19 4 q/ha i.e. 4.3 to 21.7% higher than the better check, T-163. They stand to be reevaluated.

Five promising advance kerao lines at Dholi yielded 17.7 to 20.8 q/ha as against check, BR-178 (16.4 q/ha) and at Sabour, 5 another such lines yielded 16.8 to 20.3 q/ha against the check BR-178 (16.0 q/ha). These will be further put on trials.

Lentil :

40 large seeded and 40 small seeded germplasm lines have been selected for their different genetic and quantitative attributes.

RAU-101 & PL-77-2. in the coordinated varietal trial yielded as high as 17.5 q/ha, and were at par with check Pant-L 406, Pant-L 633, PL-77-12, K-82, LG-178 & LL-153 (Dholi); while at Patna, the check, Pant-L-406 yielded 13.6 q/ha, higher than RAU-101 (13.1 q/ha).

Mung (Summer) :

Thirtythree elite lines were tested in a Coordinated trial. The line 11/395

yielded maximum (13 6 q/ha). Pusa-105, Pusa-104, Pusa-107 and 12/333 were the other lines which performed well significantly.

From the station trial, two promising lines, DM-3 (11/495×PS 10) and DM-5 (12/333×PS 16) yielded 14.1 q/ha and 13.8 q/ha respectively as against the check, T-44 (8.6 q/ha). They stand to be entered in the All India Trials.

Mung (Kharif) :

In the coordinated varietal trial, PDM-54 (13.43 q/ha) and MH-4 309 (13.35 q/ha) yielded higher and matured 17 days earlier than the check, Amrit (13.20 q/ha).

In the Initial Evaluation Trial, four new entries 11/395 (13.21 q/ha), 11/333 (12.25 q ha), DM-1 (12 19 q/ha) & ML 353 (11.51 q/ha) outyielded significantly the check, Amrit (866 q/ha), and they also matured earlier by 5, 20, 13 and 13 days respectively compared to Amrit.

Out of the 46 advance generation lines drawn from seven crosses, four lines, DM-4 (11/99×12/333), DM-5 (K 851×ML 5) DM-6 (T 44×11/395) & DM-7 (ST-7×11/99) were promising with higher yield range of (12.7 to 14.2 q/ha) and earlier maturing (65-70 days), as against better check, Amrit (11.6 q/ha) which matures on 82 days.

Urd (Summer) :

JU-77-4 (10.1 q/ha) gave highest yield in the coordinated trial. Other at pa were JU 78-3, Mash UG-236, and check, T-9.

(ii) Urd (Kharif) :

The State Varietal Trials on Kharif Urd revealed that DU-1 (9.41 q/ha), DU-2 (8.09 q/ha), SU-80-327 (7.69 q/ha) and DU-3 (7.11 q/ha) performed well and have been selected for coordinated testing programme.

The Coordinated Varietal Trials on UPU-80-5-6 outyielded (6.60 q/ha) the check, T-9 (3.40 q/ha) significantly. Besides this, 140 plants giving high pod number, earlier maturing and diseases resistance were selected from F_3 germination out of 4 crosses. Similarly, 106 promissing advance generation (F_5/F_6) lines were selected for further evaluation.

Agronomy :

Arhar :

The full package of fertilizers, weed control & plant protection measures increased the Arhar yield by 23.46% over the control; their individual share in this increase being 13.4%, 7.8% & 7.8% respectively.

The intercropping of Arhar with maize; one line of maize between two lines of Arhar spaced at 75 cm gave a net return of Rs. 7073/ha followed by Arhar + groundnut (Rs. 6272/ha).

The 1st September sowing of Arhar, MA 128-2 (19.9 q/ha), equally at par with ICPI-07-2 (19.4 q/ha) proved to be significantly better than 11th September sowing which reduced their yield to the extent of 73 to 75%.

Gram :

25th October sowing of Pant G 114 and Pusa 209 recorded yield as high as 25.10 q/ha and 24.20 q/ha respectively. But 9th December (late sown) sowing of Pusa 209 and C-235 yielded only 10.00 q/ha respectively.

Pea :

Peas, Rachna (9.20 q/ha) & T-163 (10 00 q/ha) responded well with full agronomical package, giving an increased yield over control, to the extent of 41.6% and 45.5% respectively. 31% of these full package yield gets reduced if items like fertilizers, irrigation, plant portetion and weed control measures are deleted from such full package.

Variety, Harbhojan yielded 8.6 q/ha when sown as late as 10th December just following the greenpod pea-crop which was fertilized with 40 kg N + 100 kg P_2O_5 and twice irrigated.

Lentil :

Full agronomical package can augment its yield to 18.30 q/ha, a 92% increase over the control; irrigation's share in this increased yield being 57.6%.

Summer Mung And Urd :

The study of N-economy caused by Mung (Amrit) and Urd (Navin) in maize-mung/Urd-wheat and Maize-fallow-Wheat cropping sequences, Urd yield higher than Mung, Plots after urd recorded higher yield of wheat (24.3 q/ha) than plots after mung (20.0 q/ha) and fallow (16.4 q/ha). On an average, only 50% of the recommended doze of nitrogen fertilizer to wheat in plots after mung /urd yieided higher than the fallow plots receiving 25% higher amount of recommended doze of fertilizer.

Kharif Mung and Urd :

Fertilizer (DAP 100 kg/ha) increased the mung yield by 33.3% followed by plant protection (15.6%) and weed control (11.1%). The Urd, Navin proved to be higher yielding as compared to T-9 and Pant U-19. It responded better at 40 kg P_2O_5 than at 20 kg P_2O_5/ha.

The September-sowing of mung (Amrit) & Urd (Navin) yielded better than other varieties tested alongwith.

Plant Pathology :

Arhar :

Four varieties, ICP 8863, 9175, 9229 & MAUE-175 showing less than 5% wilt infection were graded as resistant & two varieties, ICP-7867 & ICP-11049 were identified as completely resistant to sterility mosaic. while ICP 5124 were found to be fairly resistant (less than 5% infection) out of evaluation trial of 42 varieties.

In another trial screening of 142 varieties showed that ICP 8862, ICP 7906 & DA-16 showed resistance to alternaria leaf blight diseases. Its intensity was reduced from 80% to 23.75% by Dithane M-45 applied @ 2.5 kg/ha.

Gram :

In a disease resistance evaluation trial of 191 varieties/lines HAU-21-18 was found to be multiple disease resistant against wilt and alternaria blight, thus claiming to be used as a donor in the resistant breeding programme. 20 other varieties were identified as completely free from wilt infection, while 6 others showed no infection of Alternaria blight. Root Rot incidence was observed in trace in yet 30 other varieties.

In another trial with 193 varieties, only 18 were found to be free from the infection of greymold diseases.

Pea :

While screening 33 varieties against powdery mildews, varieties, HPF-5, Pant-P 5 & JP-885 remained free from this incidence, while RAU-25, 6588, T-10, HPF-12, HUP-1, DMR-8, DMR-9 & DMR-12 showed very mild infection therefrom.

Lentil :

Out of 35 varieties screened, 5 varieties : JL 554, 708, 754, 795 and LP 286 remained free from wilt,

Mung and Urd :

The Mung variety PDM-75 was observed to be free from yellow mosoic, while Pusa 106, PDM-14, PDM-73, ML-72, ML-165, MG-122, MG-132, MG-136, S-8, SPM-63, 11/99 & 11/395 showed this infection in trace, amongent the 47 varieties screened for this purpose. In the same set of mung varieties, Pusa-103, Pusa 108, PDM-2, PDM-75, DM-725 and Serial No. 61 showed light infection of Cercospora leaf spot.

In similar screening of 98 urd cultivars, AP-157, AUH-2 B, K-66/110, PLU-131, 158/161, 328, M-48, NP-21, T-65, U-79, UG-192, UPU-2-40-1 & 7368/ 4-B were found to be free from yellowmosaic. while varieties; COBG-10, AP-157,

AUH-2 B, PDU-131, 158, 161. 213 264, 294, 328, 340, 461, M-48, T-65, U-70, UG-191, 192, 201, 243, 257, 298, UM-807, UPJ-79-2-4, 14/5, 15/7, 7368/4-B were found to be free from cercospora leaf spot disease.

Foliar disease of mung was effectively controlled by its seed treatment with Bavistin (@ 0.5 gm/kg seed) + two sprayinga with Bavistin 0.02 % (200 gm/ha/ spraying), while Dithane M-45 was effective against cercospora leaf spot.

Entomology :

Arhar :

Endosulfan (0.07 %) proved to be significantly effective against pod-borer complex of Arhar. The plant production like NSK Karanj oil and neem oil proved to be a good substitute of endosulfan against podfly (pod borer) particularly as compared to the control

Amongst 10 varieties screened, MA-2, DA-2 and Schore.36 showed less infection of pod porer.

Gram :

Synthetic pyrcthroids, synthetic organic insecticides, extracts of neem seeds & leaf were each equally effective against pod borer (*Haliminthis aruniqera*) time eneuring assured yield.

Pea :

Seed treatment with carbofuran 2 % supplemented with soil application either of carbofuran or phorate @ 1 kg. a. i./ha has been giving consistent positive results for the last three years against *Stemfly* with assured higher yield.

Urd :

In a varietal reaction study on Urd pests, varieties UH-80-4, JU-78-3 and DU-3 recorded minimum pod borer damage with higher grain yield.

Seed treatment with carbofuran 2% and nil application of phorate @ 1 kg. a.i./ha increased the urd grain yield by 68.2 % and 58.6 % respectively.

Microbiology :

The study on interaction between gram varieties with Rhizobium strains revealed that strains RC_3 (Dholi) and H_{45} (Jabalpur) produced maximum yield i.e. 31.66 and 31.0 q/ha respectively with variety BG-209. The grain yield in control was recorded as 22.83 q/ha, the strain IC76 (ICRISAT) with gram Pant G 114 yield 31.16 q/ha against 23.15 q/ha in control, the strain H_{45} (Jabalpur) with Gram C-235 yielded 31 5 q/ha against 25.33 q/ha in control. These all interaction effects were statisfically significants.

Under field conditions, the Rhizobium strain RG_3 (Dholi) and IAG (IARI) gave maximum yield with Gram BG 203, while in Pea, the strains Pcress-1, Pcress-2 (Dholi) & Ranchi strain each increased the pea yield with its variety G-163, & in Lentil, the strain L cross-1 (Dholi) L cross-2, L Cross-3 & L cross-5, all from IARI increased the yield of its variety L-9-12 to 22.6, 20.6, 20.8, and 20-8 q/ha respectively, against the control yield of 13.8 q/ha.

The multilocational trial on the testing of Gram Rhizobium strains revealed that only four, i.e. IC 59, IC 2002 (ICRISAT), RG_3 (Dholi) BG_{19} (Dholi) were the best strains for the Gram Variety, Pant-G 114.

OILSEEDS

Breeding :

Linseed :

The variety, LHCK-2, LHCK-172 and Neelam with their yield range of 15 to 17 q/ha outyielded T-397 (13.89 q/ha).

Variety RAULP-2 stood first in the I.E.T. in Eastern Region and thus has been promoted for final test at National level.

In the dual purpose, linseed trials for fibre and grain yield, the fibre yield was higher in DPL-17 (26 67 q/ha) LCK-152 (32.50 q/ha) and DPL-21 (30.83 q/ha) with their respective grain yield of 9.63 q/8.42 q. and 12.00 q, each per hectare.

Rapes-Mustard :

In brown sarson varietal trials, MSB (Bihar) had the yield range of 8.66 to 11.49 q/ha, thus claiming its place in the National evaluation trial for further testing.

Under rainfed condition, the mustard KR 5610 (7.94 q/ha) and BR 50 (7.57 q/ha) outyielded Varuna (5.68 q/ha) in RAULP-1 (6.55 q/ha) in CVT. trial.

The Tori varieties, PT 507 B (12.24 q/ha) and TCSP-56 (17.18 q/ha) were found to be superior yielder (Seed) as against each of UP-70-SC-17, T-9 & BR-23.

Castor :

Varieties VHB 62, GHB 435 and Bhagya 63 with their respective yield of 1594 q, 14.81 q, & 13.89 q per hectare outyielded Aruna (10.60 q/ha).

D. Groundnut :

3 varieties : AK-12-24 (bunch), JL-24 (bunch) and M-13 (spreading) were observed for their maturity period. JL-24 matured 11 days earlier than AK 12-24, both yielding identically.

Groundnut mutants, DGM-82-5 (20.52 q/ha), DGM-20-20 (9.80 q/ha) and DGM-82-28 (20 23 q/ha), in M_6 germplasm yielded superior to their respective parents (check), M-13 (16.99 q/ha), AK-24 (6.17 q/ha) & Big Japan (13 98 q/ha.)

Variety C 336 (27.12 q/ha) outyielding the National Check, M-13 (24.51 q/ha) in C. V. trial of virginia runner type.

Virginia bunch types, ICGS-54 (25.87 q/ha) outyielded National check Robout 33-1 (18.25 q/ha) in the I.E.T.

Sesamum :

In the National Elite trials, RAU variety, Krishna recorded a superior yield (4.44 q/ha) against TC-25 of Ludhiana (1.09 q/ha) and C-6 of Bhubneshwar (3.14 q/ha). Krishna also yielded higher (5.19 q/ha) against other ex-state varieties with their yield range of 0.40 q/ to 3.33 q/ha, in the Initial Evaluation trial.

Variety Krishna has established itself as a better summer crops with its yield potential of 5 37 q/ha.

Agronomy :

Linseed :

T-397 when sown as *pairа* crop, with its increased seed rate by 25% more of the recommended doze. with paddy (SITA) can yield 15 to 20% higher seed-grains.

Rapes-Mustard :

Varuna when sown under 30 cm (row to row) spacing and 75 kg N/ha condition can yield as high as 6.80 q/ha.

Yellow sarson as a mixed crop with wheat can give a money return of Rs. 1665 /ha.

Castor :

15th June sowing of castor recorded higher yield (21.63 q/ha) & the sowing later than this resulted in greatly reduced yield.

Groundnut :

Sowing of G.nut immediately after the onset of monsoon rains increases its yield.

M-3 recorded superior seed yield at 30 cm row spacing, while early bunch kuber & AK-12-24 yield better at 20 cm row spacing.

Sesamum:

Variety M. S. Patna, Krishna, NEB 8 & B 67-S yielded identically equally (4.54 q/ha) at 20th July sowing than on 12th July or 9th September.

Fertilizer application in Sesamum has its effects enhanced when row & plant spacing of the crop are also carefully adjusted (30 cm × 20 cm for Krishna) and 20 cm × 15 cm for B 67 S, for its yield as high as 7.50 q/ha (Krishna) to 8.26 q/ha (B 67 S).

Spacing of 30 cm × 20 cm (4.63 q/ha) or 25 cm × 15 cm (3.80 q/ha) appears to be crucial for a better yield of Til.

Plant Pathology

Linseed :

Varieties SPS-77/30-5, RAULP-2, IMH-321, Flake-1, RAUIMD-5, LS-2 LC 1013, KL-134 and Himalini were evaluated to be free from rust, *Alternaria* and powdery mildew.

Linseed rust intensity could be reduced to 3.70 as against 14.70 in control by applying Difolatan (0.20%). thus increasing its yield of 8.33 q/ha as against 6.66 q/ha of control.

Rapes-Mustard :

Yellow sarson-66-197-3, Rai-RAURP-1, Tori-UP-70-SC-17 and BR-23 and Brown Sarson MSB, were found to be moderately resistant to *Alternaria*, while Tori RAUT 82-3 & RAUT-80-5 had trace intensity of this disease.

Difolatan, Dithane M-45 or Bavistin are equally effective against *Alternaria* in Rai, which reduces the disease intensity by 40%. However, 3 sprays of Diolatan (0.15 to 0.20%) first at preflowering & 2 at pod stage, proved to be resulted in the max. extra yield of 9.98 q/ha of Rai.

Groundnut :

The varietal screening test for rust, tikka bud necrosis, the main important diseases of groundnut continued to be in progress. Some lines have been identified which appear to be free from these diseases under artificial condition. The confirmation to this effect is yet to be achieved to claim any authentication of the results.

Sesamum :

RAU variety, Krishna has been found to be resistant to both leaf blight and stem rot diseases. Identification of other varieties free from phyllody, (3 varieties), stem rot (26 varieties) and leaf blight (20 varieties) has been carried out with their further confirmation to be achieved in next trials.

Entomology :

Rapes-Mustard :

The crop sown at Patna between 18th to 28th November are found to be more susceptible to aphid infestation. The early February sowing escapes it considerably, thus increasing the yield.

However, at Sabour, Boown sarson (DBS-2 and DBS-7), yellow sarson (DYS-5, YSK-820³, YSK-2 and YSIK-80-1) and Rai varieties (Varuna, RAURP-4, RAURP-5 & Pusa bold) and 55 other germplasm of its were found to be free from aphid infestation.

Phosphomidon 100 EC was most effective, amongst nine different insecticides, in reducing the aphid infestation from 158.10 to 12 13 % thus increasing this yield from 3.34 q/ha to 9.54 q/ha, followed by Endosulfan 35 EC, Dimethoate 30 EC, Chlorphyrifes 20 EC Quinolphos 25 EC, Lindane 20 EC.

Castor :

Quinphos 25 EC reduced the intensity of Capsule borer infestation to 0.67 % campared to 8.40 % in control thus increasing the seed yield from 5.28 q/ha (control) to 9.14 q/ha.

Groundnut :

The varieties Exotic-7, NG-53, NG-337, T-32, GC-9, B-31, AK-12-24, EC-1091 were found to have less than 5 % damage of the leaflets due Ash weevil.

D. Sesamum :

Two varieties out of 115 screened for pest resistance, namely 5039 and S. Dumka were found to be free from Til Hawk and Bihar Hairy Caterpillar. Variety, Krishna could escape only Bihar Hairy Caterpillar, while M 32, M-3-1 and thirteen others could escape Til Hawk moth

VEGETABLES

Breeding :

A long *brinjal* variety, Annamali Selections, has performed well for the last four years as against the present standard check, Pusa purple long, for its being resistant to pests and diseases, with its straight plants having medium upright foliage, tough stem and hardy habit. The plants number per unit area, becomes more with symactrical oblong medium sized (15.6 cm × 4.2 cm) fruits of deep purple colour and when cooked, its flesh has soft texture without better taste.

Varietal trial with *long brinjal* revealed that KT-4 gave highest yield (134.7 q/ha) followed by PBR-129-5 (111.45 q/ha) and Azad Kranti (97.59 q/ha). Amongst *round brinjal*, Kalyanpur Round (139.53 q/ha) was the highest yielding

variety followed by Pusa Hybrid (127.22 q/ha) and Azad Hybrid (118.70 q/ha). The May (early) planting of *brinjal* brought to light the variety Kachbachia (1 4.61 q/ha) as maximum yielder, while it also topped in yield (256.28 q/ha) when sown in July (Main season crop).

Arka Jyoti, a *water melon* variety has performed well in terms of its yield (141.76 q/ha) for the last four years, followed by Sugar Baby (113.74 q/ha) & Durgapura Mitha (83 85 q/ha). It deserves 'on farm last' for its prerelease multiplication.

"Patnai" a promising selection (Sel 78-2) of summer *bottle ground* from Patna area has been found to be superior to Pusa Summer prolific long and Faizabad.

Shital, a *tomato* variety could be identified with its yield potential (522.26 q/ha) followed by Mangala (406.93 q ha).

In *bhindi* S-2 could be observed to give maximum yield of 51.50 q/ha, followed by Lam selection (34.42 q/ha), in a varietal study.

In the current varietal trial on *Chillies*, the variety G_4 could be identified with the max. yield (21.71 q/ha) of semidryripe podes, followed by K-235 (16.80 q/ha) and Jawarhar-218 (16.54 q/ha). However, the post three year data on the varietal trial on Chillies has shown that the selection No. 58-41 gave maximum fresh pod yield (75 06 q/ha) followed by collection No. 46 (74 40 q/ha) both at par, against the standard check, Sabour Angar (72.30 q/ha).

Varieties, JDL-37 (63.25 q/ha) and JDL-79 (54-74 q/ha) of *Common been* could be identified as promising in the varietal trial.

The *cucumber* selections, 72-15 (98.50 q/ha) and 72-10 (95.25 q/ha) were found promising amongst the 12 collections studied.

In a pilot trial on *Onion* with 8 varieties, N-78 (200-0 q/ha), N-53 (133.33 q/ha) were observed as promising in the Kharif onion group.

Some good yielding lines of *ridge gourd* i. e. LA-1, LA-2, LA-15, 24-54 82-2 were identified as promising, each equally potential, with the maximum yield of LA-1 (62.50 q/ha) followed by LA-a (60 0 q/ha) and LA-15 (57.50 q/ha).

Relection 80-3 of *sponge gourd* could be evaluated as having a promising yield potential (74.3 q/ha) as against Pusa Chikin (58.56 q/ha) along with its superior bold fruit & soft texture.

Promising lines of *Parwal*, namely, Bandli, Safoda, Hilli, Nimia, Bagralia and Cuthalia have been identified to be further tested for their large scale multiplications for general farming.

Pusa Rasmi and Japanese White are the two promising main season *Radish* varieties identified for October to February sowing, while Pusa Chetki performed well for spring summer as well.

M C.H.-1 (281.61 q/ha) and selection-8 (264.17 q/ha) in *Cabbage* have shown incouraging results.

Agronomy :

Kalai (Urd/Black gram) was found to be the best inter-crop with *Bhindi* in a crop association compatibility study, while Luffa as alternative intercrop caused drastic reduction in Bhindi yield.

Sowing *Bhindi* seed 30 cm apart on both sides of the ridges during rainy season proved to be the best sowing method for assured yield. The ridges should be 60 cm apart.

For *Chillies*, application of 120 kg N, 60 kg P_2O_5 and 80 kg k_2O per hectare resulted in the maximum yield (42.63 q/ha) of red ripe but undried chillies in the 3 year combined yield analysis, giving a net return of Rs. 5361/ha and B-C ratio of 2.69, in the trial, "Fertilizer Requirement of Chillies".

For the "Optimum Date of Transplanting of Chillies", the 11th and 21st August transplanting indentically recorded the maximum yield in Pusa Jwala (15.84 q/ha), Sabour Angar (14.21 q/ha) and NP 45-5 (14.24 q/ha) in their semi-dry pods stage.

In *Cauliflower*, the plant density at 75×45 cm spacing recorded maximum seed yield of 567.66 kg/ha.

The yield maximising fertilizer requirement of *Raddish Seed* production was determined as 80 kg N, 60 kg P_2O_5 and 40 kg K_2O per hectare, with a per hectare net return of Rs. 4203.25 as against the control (no fertilizers), in a combined 3 year yield and net return analysis.

The Garlic clove size of 1.6 to 2.0 gm at a spacing of 10×10 cm recorded the maximum yield of 152.08 q/ha.

The ideal sowing date of Garlic in the last 5 year yield data analysis, was found to be on 15th October with maximum yield of 174.40 q/ha, as compared to 1st November (143.13 q/ha) planting.

Nematology :

In the varietal screening in *Brinjal* against resistantance to Root Knot nematodes revealed the Gall Index of 1, 2 and 2 for Annamalai, Banaras Giant and Vijai respectively.

Carbofuran @ 100 and 500 ppm & Phorate @ 25 and 50 ppm proved to be effective in reducing Root knot gall index on seedling when applied in seed and

seedlings of *Brinjal*. As soil treatment, the carbofuran @ 3 kg a.i./ha and Phorate @ 2 kg a. i./ha were found effective in reducing gall index.

In an Associations study of nematodes with wilt and Root knot disease complex, nematodes, *M incognita*, *M. javanica* and *Rotytanchlus* among endoparasitee and *Tyleachorhynchus*, *Hoplolaimus*, *Helicotylenchus* & *Pratygenchlus* among ectoparasite were found to exist in dominating proportion alongwith fungi like *Fusarium sp.*, *Rhizoctonia sp.* and *Pythium sp.* in smaller proportion.

Amongst the Tomato varieties tested against Root Knot nematodes, serial 120 showed its in festatives but within the tolerance limit.

FRUITS

Breeding :

Mango :

68 new collections from various parts of the country and also this State have been established for their studies.

A varietal trial on 20 important commercial cultivars showed satisfactory growth of the plants.

Only 2 out of 3 stones of the fruits obtained from 1801 hybridization crosses were found to have germinated and the plants there of growing well.

In the study of plant propagation in Langra variety by different methods, inaraching method resulted in maximum growh of the plants. In order to make marcotted plants, best rooting (35.4%) and best survival (63.7%) was obtained with mud poultice alongwith IBA 3000 ppm and riboflavin (0.5%).

Litchi :

23 new collections have been established for their evaluation and to be further used in hybridization programme.

Only 39 out of 68 stones of the fruits obtained from 2541 courses could germinate and the plants there of were found to have satisfactory growth.

Guava :

18 new collections were studied in respect of fruit qualities. Sardar (Lucknow-49) had maximum fruit size and fruit weight as well followed by Allahabad Safeda.

Citrus :

In the collection group of citrus, the fruits of Marsh Pink cv. of Grapefruit and Red fleshed cv. of Pummelle were found to have better quality.

In the varietal trial on limes and Lemons, plants of Jambhiri Lamon and Galgal have shown maximum growth.

Banana :

Bhimkel and Bombay Green have been added as two more new collections in the already established 114 varieties. The weight per bunch was recorded as maximum (12.62 kg) in Kaller and Mauthan.

Kanthali, amongst the 10 table type cultivars was found to yield highest number of fingers, while longest & widest fingers were found in local Muthia, in the varietal trial on table purpose banana. Among vegetable types, Battesa gave maximum number of fingers, while the longest and widest finger were found in Bankel.

Coconut :

Highest survival rate of 83.3% was observed in each of Fiji & Phillipines varieties amongst 8 varieties planted. The leaf formation and growth of plants of 17 other collections were found satisfactory in Guarm, Ceylonetall and Barneo varieties.

Other Fruits :

The study on other fruits mostly consisted of maintaining some old collections and adding some new ones for their growth, flowering and fruiting behaviour. 15 such collections in Awla, 17 in Ber, 11 in Pomegranade, 22 in Bael, 19 in Jackfruit, 8 in Jamun and 4 in Mulberry were studied for their basic growth and development parameters.

MILLETS

Breeding :

Ragi :

Early duration genotype RAU-3 yielded maximum (20.63 q/ha) followed by PES-83-2 (19.47 q/ha). The mid duration genotype RAU-8 maintained its yield superiority (21.2 q/ha). Their consistent stable higher yield has enabled them to be taken as pre-release varieties in the All India Millets Workshop.

Barnyard Millet :

Genotype ECC-6 (17.61 q/ha) and ECC-11 (15.03 q/ha) have been observed to be promising lines. ECC-8 (12.59 q/ha) was yet another promising line identified.

Italian Millet :

Genotype SIC-4 (19.06 q/ha) was identified as the most significantly high yielding, BS-3 (15.92 q/ha) was another satisfactory high yielding variety.

Sorghum :

Hybrid SPH-221 performed significantly well (28.15 q/ha) as compared to the other check hybrids CSH-5, 6 and 9 Another variety, SPV-286 yielded 26.19 q/ha.

Bajra :

The genotype MP-90 gave as high as 35.49 q/ha as compared to the check, WCC-75 (25.29 q/ha).

In the fodder trial, UUJIVM gave highest green fodder yield of 344 q/ha followed by L-72 (307 q/ha).

Cheena :

20 new germplasum were added to the germ pool, and were studied for different characters. Variety RAUK-5 recorded highest grain yield (26.94 q/ha) followed by BR-7 (26.57 q/ha) with the per day production of 32.85 kg and 34.51 kg. respectively.

Genotype 5013 maintained its yield superiority of 24.46 q/ha over the check BR-7 & MS-4872.

Mean grain yield of the new genotypes tested in Station trials varied from 18.18 q/ha to 30.54 q/ha with a mean yield of 25.15 q/ha. Genotype 9711 outyielded (30.54 q/ha) other, followed by genotype 9920 (29.63 q/ha), with their per day production of 40.18 kg & 38.48 kg respectively.

Agronomy :

Ragi :

Variety HR-919 responded fairly well at 60 kg N/ha, giving highest yield of 18.23 q/ha, followed by BR-407 (16.15 q/ha).

Azospirillum application with seed sown at 20 kg N/ha fertilization rate, considerably increased grain yield (12.73 q/ha) over the control (5.21 q/ha).

Barnyar Millet :

The ideal seed rate was estimated to be 12 kg/ha, which favour highest plant stands with grain yield of 18.44 kg/ha. The sowing between 23rd June to 5th July appeared to be optimum sowing time for maximum grain yield.

At 40 kg N/ha, its yield can be obtained as high as 14.72 q/ha. P_2O_5 was found to be a yield increasing factor up to 20 kg P_2O_5/ha against no P_2O_5.

Italian Millet :

The ideal seed rate was estimated to be 8 kg/ha, giving highest grain yield of 13.64 q/ha if sown between 23rd June to 5th July.

At 40 kg N/ha, its yield was recorded as maximum (12.46 q/ha). This crop also responds favonrably to P_2O_5 (20 kg/ha) for increased yield.

Cheena :

15th March was observed to be the optimum sowing time for maximum yield (19.12 q/ha).

As catch crop between *Kharif* & *Rabi*, sown on 1st September, its yield of 6.12 q/ha can also be obtained.

BR-7 was found to be the best summer variety, while, MS-4872 was most suitable for September sowing.

At 60 kg N & 20 kg P_2O_5, the crop responds favourably with maximum yield.

F. Y. M. @ 100 q/ha alongwith Azospirillum inoculation considerably increased the grain yield. The highest grain yield of 10.26 q/ha was obtained with (20 kg N + 100 q FYM + Azospirillum treatment)/ha, rollowed by (20 kg N × Azos./ha (9.10 q/ha) and 20 kg N/ha (7,79 q/ha).

Sowing two rows of cheena between the two rows of Mung (as Mixed crop) can fetch a net profit as high as Rs. 2861.25/ha for Summer Cheena and Rs. 1428.00/ha for September Cheena.

Cheena grown as mixed crop with Arhar can fetch a net profit of Rs. 1890.75/ha when its three rows are sown between two rows of Arhar.

Plant Pathology :

Ragi :

Four cultivars; ELC-3, ELC-4, TNAU-285 and PR-202 showed resistance against blast. Spraying with Kitazin (0.1%) effectively decreased the disease infection in leaf (66%), neck (56%) and finger (72%) and simultaneously increased the yield by 27.6% over the control. Blast causes loss in Ragi to the extent of 48.3% as estimated.

Barnyard Millet :

Four varieties, ELC-6, ELC-8, VL-21 and KE-6 showed resistance reaction to *Helminthosporium frumentacei*.

Italian Millet :

Seven entries; No. 8736, 8737, 8739, 8741, 8742, 8750 and 8755 showed minimum infection of blast and *Helminthosporium setariae*.

Cheena :

Of the 111 germplasums of Cheena, only 13 entries could be identified as resistant to *Helminthosporium* leaf blight. The mximmum yield loss of 24.53% due to this pathogen was estimated in cultivar, PM-29.

Treating seed with Captan 2 g/kg seed plus one Spraying of Bavistin (0 05%) at earhead stage decreased the leaf blight incidence by 71%, resulting in 28% increase in grain yield over the control.

Entomology :

Ragi :

The maximum incidence of Cocasia (12.0%) and Hiliothis (32.7%) were recorded on NMR-852 and PES-500 respectively.

The line TNAU-294 was screened out as the best variety with no incidence of Cocasia and lower incidence (6.0%) of Heliothis.

In the rescreening of Ragi cultivars, PR-202 was found to have minimum incidence of Cocasia (1.3%) and Heliothis (9.0%).

Cheena :

The shootfly (*Atherigona sp*) incidence were observed in varying degrees in the different cheena germplasmus. The lowest and highest percentage deadheart and white earhead were observed in GMPR-168 (3.84, 7.22) and GMPR-147 (16.62, 19.26) respectively. The percentage deadheart and white earhead increased with the advanced dates of sowing. The lowest percentage deadheart and white earhead was obtained (7.56 and 5.5) respectively when the crop was sown in the first week of march giving maximum yield 18.66 q/ha.

SPICES

Breeding :

Ginger and Turmeric :

Of the 29 germplasums of ginger, the genotype, Nadia and amongst the 52 genotypes on turmeric the line RH-8-80 were found to be promising one.

In varietal trial on turmeric, entry RH-10,20 outylilded (402.73 q/ha) others, the minimum yield (208.33 q/ha) being from Mannuthy local (Kerala). The variety Dindigam had maximum curring percentage (37.5%) producing 87.34 q/ha of cured turmeric.

Coriander :

The variety CS-44 (Muzaffarpur) was found to be the most high yielding one (16.67 q/ha) amongst the 13 such varieties tried Variety UD-97, a Udaypur collection yielded at par (15.56 q/ha) with CS-44. Both these varieties significantly outyielded the local check, CS-41 (Dholi local) which yielded only 5.09 q/ha.

Fennugreek :

The variety TF-16 (Siwan-2) was identified as the most high yielding one 13.16 q/ha) amongst the 15 different varieties in the varietal trial followed by UM-29 (13.52 q/ha), and at par stastistically superior to local check TF-14 (5.44 q/ha).

Fenne :

The variety UF-35 (Udaipur) yielded highest (11.32 q/ha) follwed by FV-20 (Kahalgaon) yielding 10.49 q/ha and UF-46 (10.45) q/ha), amongst the 9 different varieties tested in the varietal trial.

Agronomy :

Turmeric :

The seed rhizomes with 4 buds (Av. wt. of 21 gm) sown on raised bunds produced the maximum yield of 105.20 q/ha., as against 2 bud rhizomes (Av. wt. of 15 gm) and planted in furrows.

Planting 1,11,000 mother rhizomes (Av. wt. 30 gm) at 30 cm × 30 cm spacing can yield as high as 275 q/ha, while planting daughter rhizomes @ 82.350 plant/ha with av. wt. of 10 gm. at 40 cm × 30 cm spacing can yield the minimum (48.59 q/ha).

The fertilizer response of turmeric was recorded as maximum in term of its yield (103.15 q/ha) at 150 kg N_2,50 kg P_2O_5 and 100 kg of K_2O per hectare.

Coriander :

Significantly higher yield (17.46 q/ha) was recorded under the treatment of 40 kg N + 40 kg P_2O5 + 20 kg K_2O/ha as against the 3.25 q/ha lowest yield of check (control).

Nigella :

The crop can also be grown (sown on 14th March) economically during summer season with a yield of 5.54 q/ha.

The crop responded maximum in terms of its yield (11.19 q/ha) to 40 kg N + 40 kg P_2O_5 per hectore, at the standard doze of 20 kg K_2O for all N-P treatments.

Fennel greek :

The crop yielded maximum (7.38 q/ha) at 40 kg N + 40 kg P_2O_5, significantly higher than the control (0.95 q/ha).

Fennel :

The crop responds maximum in terms of its yield (8.75 q/ha) at 40 kg N + 60 kg P_2O_5 per hectare, significantly higher than the control (0.78 q/ha).

Onum :

It has been observed that the crop can also be successfully grown, during summer season, yielding 7.26 q/ha when sowan during 27th Feb. to 14th March.

Applying 40 kg/ha each of N & P_2O_5, gives maximum yield of onum (9.45 q/ha), significantly superior to the control (1.19 q/ha).

Plant Pathology :

Ginger and Turmeric :

The leaf spot disease was greatly reduced by soaking seed rhizome with Captan (2 g/litre).

The foliar spraying of ginger by Dithane M-45 proved to be highly effective in controlling leaf spots. But for turmeric, Bavistin sprayings proved to be the best fungicide.

No turmeric variety was fund to be free from Taphrina. But seven varieties, G.L. Puram I,II, Kodur, Arnoor, RH-280, RH-11.80 and Duggirete were found to be resistant against *Collectorichum*.

Coriander :

The stemgall disease incidence was observed to be ranging from 8.3% (Dholi purple) to 30.3 % (Dholi dwarf) amongst all the coriander varieties screened.

Bavistin (1 gm/kg) proved to be highly effective as seed treatment, which reduced the disease incidence to 10.72% and thus ensuring the yield of 10.72 q/ha.

Fennelgreek :

The degree of infection of *Cercospora* leaf spot disease was estimated to range from 4.3% at Dholi to 14.3% at Saran, in the pest survilliance work.

Seed treatment with Captan, Emisan, Difolatan, Thiram each @ 2.5 gm/Kg of seed or Bavistin (1 gm/kg seed) proved to be equally effective against controlling this disease.

Spaying with Bavistin 0.03% reduced the disease incidence to 3.3% and ensuring yield of 8.45 q/ha, followed by Dithane M-45 0.2% which reduced disease incidence to 5.6% & ensuring yield of 8.10 q/ha.

Cumin :

The Alternaria blight in cumin can effectively be controlled with either Captan, Emisan, Difolatan & Thiram each @ 2 g/kg seed or Bavistin @ 1 g/ha of seed.

Entomology :

Fennel :

Malathion (0.5 kg/ha) when applied to the plots considerably reduced the incidence of Aphids in the crop. Carbaryl, Dimethoate and Phosphomedon are equally effective against this pest.

Micronutrient :

Coriander :

It was observed that copper sulphate sprays (0.25%) recorded the maximum yield of 11.19 q/ha followed by ferrous sulphate (0.5%) which can help in getting 18.89 q/ha, 0.5% of Zinc sulphate (10.58 q/ha). These were significantly superior to 5.25 q/ha yield obtained in the control. The percentage responce of copper, Iron and Zink were 113.14, 107.45 & 101.14% respectively.

SUGARCANE

Breeding :

15 varieties flowered, out of 390 genetic stalks, for crossing programme. 110 germplasms comparising of Co, foreign and indegenous cane of *S. barberi* and *S. sinense* were planted. 25067 seedlings from inter-varietal crosses were further multiplied. 227 and 79 seedlings from C_1 and C_2 clonal generations respectively were selected for further testing and evaluation. In the zonal varietal trial for East Zone (ICAR), B.O. 91 significantly outyielded CoS 767 (518 q/ha).

Agronomy :

In the mid early group, CoX 37058 and CoX 37331 were satistically at par with standard B.O. 70 in terms of yield and juice at Pusa, but were significantly superior to B.O. 70 at Patna.

Intercropping with wheat, the sugarcane yield significantly gets reduced and so was the effect of pulses, oilseeds and garlic, whereas sugarcane yield is not affected when intercropped with Mangrella *(Negella satira)*.

Potato and Tobacco as intercrops to sugarcane act complementary to the later and increased its yield.

Sugarcane, B.O. 91, B.O. 99, being at par in terms of yield were, however, each significantly superior to B.O. 90 and B.O. 70 as a Ratoon crop.

All ratoon crop responded upto 225 kg kg N/ha, giving maximum yield. The ratoon B.O. 91 and B.O. 99, each at 150 kg N/ha significantly outyielded ratoon B.O. 90 even at 225 kg N/ha.

Split application of N was found to be better than single application.

Application of N upto 180 kg/ha has a linear response to cane yield.

Mycology :

Cane varieties Cox 37058 and Cox 37852, with varietal trials were resistant to Smut, while Cox 37381, Cox 38018 and Cox 37832 were moderaly resistant for three years. Out of 62 germ plams/genotypes collected from different places, Co's 6518, 7217, 7320, CoJ 67, CoLK 7707, CoLK 7710, CoLK 7711, CoS 767 & CoS 770 were resistant, while 6616, 6806, 6907, 6918, 7404, 7514, 7604, 7634, 7717, S-71-1038 and CoS 771 were moderately resistant. Rest 13 were moderately susciptible, one was susciptible and 13 others were highly susceptible to Smut disease.

Only, BO,108 and X40517 showed no wilt infection.

Six-month old debris of soil serves as a source of secondary infection of Red-rot. Red-rot appeared in plants which were previously heat-treated.

Entomology :

A combination of mechanical and chemical treatment reduces the pest

load as against untreated crop, thus increasing the yield by 21 % with an added 49 paise per rupee investment.

Gross hopper attack was maximum in September.

The parasite and predator, *Stenobraco duseae* CAM (the larval parasites of borers) was maximum throughout the year), the extent being of parasitization extent being 25.5 % during September, which coincide with the 4th brood of top borer and against Stem borer larvae.

Soil Science & Agril. Chemistry :

Soil test and crop response :

The nutritional requirement of Sugarcane for N was estimated to be 4.23 kg for quintal of yield to be produced.

The yield response per kg N/at 60 kg N level was maximum (0.79ton/ha) in case of B. O. 88 and lowest (0.193 t/ha) in case of Co 1148).

Application of 30 kg or 60 kg K_2O/ha significantly increased the sugarcane yield against no Potash, without affecting the juice quality.

However, Potash when added to different soil type (leached loamy sandy of Purnea and Sandyloam of Champaran/Pusa caused significant yield differences.

Micronutrient :

Application of Boron C 5 kg Borox/ha increased the cane yield by 15 t/ha over the control.

Application of $F_e + M_n + Z_n$, (25 kg $F_e SO_4$ + 25 kg $M_n SO_4$ + 25 kg $Z_n SO_4$)/ha increased the cane yield by 12 t/ha.

Microbiology :

Application of Azotobacter culture (@16 pkt/ha + 35 kg N/ha) in sugarcane saved 30-35 % N. The N assimitation in cane leaves increased at the grand growth perid in this culture induced field. In calcorious soil, this way, cane yield was obtained at 35.11 t/ha and 75-50t/ha in non-calcarious soils.

Biochemistry :

The heat therapy experiment on some promising surgarcane varieties revealed that it increased the yield of B. O. 99 and B. O. 70 significantly while reverse was observed in Co 1148. Brix value, Pol. % and purity % were all highly significant in all cases. Invertage activity in cane was observed maximum at harvest time than in earlier stage.

B O. 70 gur has better colour as against that of B. O. 104 and Cop 801, but the purity and glucose content of the B. O. 104-gur were superior to that of B. O. 70, hence the former is choice preferring.

Soil testing and technology :

In salf tolerance trial it was observed that B. O. 43, B. O. 88, B O. 91 and B. O. 99 were resistant upto salt cpncentration of 12.5 mm hoc/cm with respect to yield and agronomical performance. In general, N, P and K in leaf sheath decreased as the level of salinity increased i.e. at about 24 mm hoc/cm and also the sugarese and juice % got deteriorated.

JUTE

Breeding :

Of the 249 germplasems of jute : 196 in the *Capsularis* and 55 of *Olitorius* types, some interesting types have been isolated with their faster growth (2.0 to 2.5 metre high) and early maturing characters (flowering within 65 to 95 days after sowing). Their fibre content have also been found fairly high.

In an advance varietal trial with *Capsularis* jute, variety JRC-7447 yielded 12.08 q/ha of fibre, followed by UPC-7716 (11.24 q/ha). Their further confirm ation is continued.

In the Initial performance of *Olitorius* jute JRO 524 recorded highest fibre yield of 45.27 q/ha.

Agronomy :

Weed control in jute by Fluchiratin (Basalin) @ 1.0-1.5 kg a. i./ha proved to be significantly effective for both *Capsularis* and *Olitorius* type, as against the control. Similar results were obtained with Fusilade weedicide. Two hand weeding was also proved to be highly significant as it ensured the fibre yield of 27.91 q/ha in *Capsularis* (JRC-212) and 25.19 q/ha in *Olitorius* (JRO-524).

The ideal seed rate of 5 kg/ha for *Capsulars* and 4 kg/ha for *Cletorius* sown in rows with 12.5 cm plant to plant distance gave 23.90 q/ha yield for *Capsularis* and29.21 q/ha for *Olitorius* jutes.

Jute fibre yield and nitrogen application to *capsularius* have been found to be positively correctated up to 60 kg N. For 60 kg N-level treatment, the crop when harvested within 140 days of its maturity, the yield was significantly higher than when harvested earlier than 120 days.

In *Olitorius* Jute (JRO-524), the jute-potato rotation proved to be highly remunerative in terms of net profit of Rs. 11078.67/ha followed by jute paddy-wheat rotation (Rs. 9904.67 q/ha net profit).

The Pusa-2-21 paddy when sown after harvesting jute, Capsularis (JRC-212) grown with either 40:40:20 or 60:40:10 N:P:K fertilization schedule, yielded 21.56% to 21.62 q/ha. Such residual effect of jute fertilization on the paddy crop to follow was indeed significant.

Plant Pathology :

Seed treatment with Bavistin @ 2 gm/kg seed followed by two foliar sprays (0.86%) effectively controlled the root and stem rot diseases (10.80%) of Jute, *Capsularis* (JRC-412) with its yield of 22.57 q/ha fibre, followed by seed dressing with Dithan M-45 @ 4 gm/kg seed and two foliar sprays with difolatan (0.2%) which reduced these diseases to 14.66 % with the fibre yield of 9.93 q/ha.

Amongst the non-chemical control for stem and root rot disease in *Olitorius* jute (JRO 524), the application of neem cake and castor cake (@ 4 7 tonnes/ha) recorded significant disease incidence reduction (to 21.60° and 24.65°) with the fibre yield of 16.85 q/ha and 19.02 q/ha, respectively. In the *Olitorius* jute (JRO 524) also like *Capsularious* jute, the seed treatment with Bavistin @ 2 gm/kg seed and its two foliar sprays (0.1%) proved to be most effective, againt stem and root rot disease by reducing the incidence to 10.54 degree and giving fibre yield of 19.88 q/ha. Fytolan @ 2 gm/kg seed and foliar sprays (0.2%) was next to Bavistin in controlling these diseases to 15.51 and fibre yield being 18.10 q/ha.

Entomology :

The 3 year pooled data have established that when Methamidophos applied at fertnightly interval @ 0.05% was most effective in it proved controlling the pests in *Olitorious* jute. The infestation was reduced to 40.91% and its intensity (2.25 purcture/plot) as well, thus giving a dry fibr yield of 30.27 q/ha as compared to the control (infestation rate 66% and intensity 5.88).

The loss in fibre yield due to major pests of jute was established to the extent of 40.7% by artificial inoculation under caged condition.

Tow sprayings of foliar spraying by Dicofol (Kethane) @ 0.02% significantly lowered the incidence (24.3%) of *yellowmite* of Toass jute, thus ensuring dry fibre yield of 29.31 q/ha, as against the control (19.60 q/ha). Endosulfan (28.88 q/ha) and Dimethoate (25.47 q/ha), however, proved to be equally effective.

Soil Science :

As standard dozes of Phosphate and Potash 30 kg/ha each, the application of nitrogen of 60 kg/ha (splitted as 22.50 kg/ha as basal doze, 22.50 kg/ha top dreasing and 7.5 kg/ha at each of two sprayings at 60 days old crop) with and without Borax (15 kg/ha) recorded the highest significant mean yield of 26.34 q/ha in *Capsularis* jute (JRC-321).

The highest jute seed yield of 7.11 q/ha was obtained by applying Nitrogen @ 50 kg/ha (Splitted as basal, top dressing and foliar sprays) alongwith standard doze of 30 kg/ha each of P_2O_5 and K_2O.

However, at 30 kg N/ha, the P_2O_5 K_2O applied @ 40 kg each per hectare, in *Olitorius* jute (JRO-524), gave the highest jute seed yield (7.69 q/ha)

SEED TECHNOLOGY

The experiments conducted to standardize the produere for breaking the dormancy for germination in lentil, revealed that all the three varieties of lentil (BR-25, BR-26 and PL-639) had dormancy. Variety PL-639 containen more hard seed than other varieties. Seed Treatment with conc. sulphuric acid (1.8 sp. g) and scarification were found to be effective in breaking the dormancy.

The germination of wheat varieties viz; HP 1102, HP 1109, Sonalika, UP 115, UP 262, and C-306 were maintained above certification standard (85%) in polythene bag of 300 graze up to 10 months of storage. Variety HP 1102 maintained its germinability above 80 percent in polythene bag even after 22 months of storage. This variety was found to be better stoper than other varieties in all containers. Similar trends were observed in second year of experimentation (1982).

In maize, all the containers (Polythene bag, cloth bag, Polyeoted Jute bag) maintained more than 80 percent germination for 9 month. However, the seeds maintained higher germination (93%) by country storage method. Further studies are in progress.

In lentil, with extension of storage period (7 months) the dormancy of all the varieties (BR-25, BR-26 and PL 639) of lentil was broken and germination percentage increased. The Seeds maintained higher germination in polythene bag and earthen pot than laminated and cloth bag.

Harvesting of maize after different periods of silking (30, 35, 40, 45, 50 days) did not affect the seed yield. However, seed moisture contant was reduced with delay in harvesting. Harvesting frequency did not affect 1000 seed weight germination and shelling percentage.

Pre-harvest rain reduced the germination of wheat seed considerably. Both the varieties af wheat sonalika and HP 1102 affected by pre-harvest recorded only @ 10 perecntage germination more whereas seeds having no preharvest rain maintained more than 80 percent germination after 4 moths storage (August 1983).

The effect of graded, ungraded small and large seed on seed yield of wheat was not significant for two years. However, in the third year large and graded seed produced higher yield than ungraded and small seeds.

Like wheat similar result were obtained in maize in which different treatments affected the growth (Plant height) for 60 to 75 days but the difference disappeared with the maturity of the crop.

For Production of Bhindi seeds, the planting of Bhindi on 10th and 20th June produced significantly higher seed yield than later plantings. The spacing between row and plant had significant affect on seed yield. The highest yield was obtained at closer specing of 45×45 cm. Early planting (10th June, 20th June) also increased the seed germination.

Bahar Variety of Arhar produced higher yield than Basant. Plantiing on 20th June at 50×30 cm spacing produced the highest yield. The September sown

crop could not produce consistent result and performance vary poor due to heavy infestation of *Alternaria* despite suitable control measures.

In potato, the seed size of tuber and spacing had significant affect on tuber production. With the increase in seed size from 20 to 50 gm the yield of tuber increased significantly. Reduction in spacing from 60×20, and 50×20 cm to 40×20 cm also increased the yield. This highest yield of tuber was obtained when the tuber of 50 gms were consistant for both the years.

Planting of both the varieties of potato (K Jyoti and K. Deva) on 31st October produced significantly the highest tuber yield and the yield was reduced progressively with the delay in plauting. Haulm cutting duriug crop growth reduced the yield. But the reduction was severe when the hulm were removed early. The effect of spraying 0 01 percent Rogar did not affect the yield.

Among the 20 varieties of potato K Sinduri produced the highest yield (213 q/ha) and was statistically at par with K. Lalima and K. Deva.

In carrot, the highest seed yield was obtained with 80 kg N/ha and planting at 60×30 cm. The result suggests to conduct further experiment to determine the optimum level of nitrogen and spacing for seed production.

In palak the application of nitrogen increased the seed yield and the highest seed yield (15 q/ha) was obtained with the application of 30 kg N/ha and one or no cutting of leaves. Higher level of nitrogen and more than one cutting of leaves reduced the seed yield. This trend was consistent for three years experiment conducted.

In Radish, the highest dose (80 kg N, 80 kg P_2O_5) included in the experiment resulted in higher seed yield. The yield increased further when Potash was also applied with N and P. The highest seed yield was recorded with the application of 80 kg. N, 80 kg. P_2O_5 and 40 kg. K_2O per hectare.

In Onion, the effect of date of planting (16 Sept., 15 Oct., 15 Nov.) and size of the bulb (1.5 to 4.5 cm diameter) on seed production was studied. The highest seed yield was obtained when 3.5 to 4.5 cm diameter bulbs were sown on 15th September and the lowest seed yield when 1.5 to 2.5 cm diamer bulbs were sown on 15th Nov.

The Cauliflower seed production was found to be significantly effected by plant density. The maximum yield (5.9 q/ha of seed was produced when plants were transplanted at 75×40 cm spacing. Transplanting at 75×80 cm gave the lowest seed yield.

In another experiment of cauliflower the effect of sowing time (from 15th June to to 6th Aug.) on seed yield and seed quality was investigated. The

highest seed yield (10.8 q/ha) was recorded when sowing was done on 24th June. Sowing on 5th Aug. recorded the lowest seed yield (4.2 q/ha).

The extent of out crossing in Arhar could not be assessed due to un synchronised flowering and segregation of one of the line before crossing.

Eighteen lots of foundation seeds of paddy and fourteen lots of wheat seed were subjected to grow out tests. Two lots of paddy of Sheikhpura (Variety-Massuri) contained more than certification standard 0.05% off type plants. 0.83 and 1.7% respectively). All lots of wheat were found to be pure as per certification standard.

At Pusa, thirty samples of 5 varieties (Pankaj, Janki, IR 8, Marsuri and Rajendra Dhan) of paddy collected from different containers/locations revealed maximum discolouration in the variety Jaya. The highest germination was recorded in the sample collected from standing crop and the lowest from mudbin.

Pathology :

At Pusa, *Alternaria, Drechalera, Trichoconis* and *curvularia* were found invariably associated with the seed samples. Viable spores of *Aspergillus, Pencillium, Alterneria* and *Helminthosporium sp.* were observed.

Out of seven fungicides tested Emisan (0.3%) was found to be more effective in controlling *Drechslera oryzae* followed by captan.

As Sabour, six fungicides Captan (0.2%) Emisan (0.1%), Bavistin (0.05%) and Thiram (02%) were found to be effective in reducing the seed born infection of *Helminthosporium sp.* and *Pyricularia sp.* Rasushamycin (100 ppm) and Plantomycin (100 ppm) were found to be effective in reducing the loads of *Xanthomonas sp.* from seeds and reduced the infection.

One hundred seed samples were collected from five districts of North Bihar, *Dreschlera Sativum, Alternaria triticina, Fusarium moniliforme, Aspergillus flalvus* and *A. niger* were found to be associated with the wheat seed samples. Maximum percent seed mycoflora was found in the samples collected from Darbhanga and Madhubani and miniom from Samastipur district while considering the location effect.

The tolerance limit of loose smut of wheat revealed that spore of loose smut could infect up to the distance of 100 meter and maximum infection were found to be in the east direction wind. It suggests that the seeds may be used for next year sowing after selecting wheat seeds beyond 100 meters of infection range.

Delsan (.2%) and Captan (.2%) were found to be more effective in controlling the seed pathogens of wheat.

The infected seeds of Brassica collected at harvest were stored at 0°C. Infection of *Alterneria brassicae* and *brassiucola* were reduced in storage, whereas infection of *A. alternate* increased.

Among the *Brassica sp.*, *Alternaria* leaf spot is the only serious disease whereas white rust is only found in traces inthe State.

ICC 8985, HAU-21-18-19, HAU-21-19 and HAU-16-83 were totally free from root rot complex of gram including grey mold. In case of Lentil JL 534, 708, 734, 795 and LP 286 were totally free from wilt and rust.

ANIMAL HUSBANDRY

Breeding and Production:

Cow:

The highest average milk production (3305.5 lit) of all lactatious during the year was found in HF×SW crosses, followed by 2691.20 lit. in J×H (F), in cow.

The highest wet average was recorded in J×H (F_1 7.7 lit) followed by 7.3 litres in HF×SW (75%), in cow.

The average first lactation production in Haryana cow was recorded as 1440 lit, among all four lactations.

The 4th lactation in J×H (F_1) recorded highest average milk yield of 2996.4 lit., with individual record of 4501.2 lit.

Dry period in Haryana cow was observed to be increasing with the increase in lactation period.

Improved feeding and management of cows reduces the age in cow at first and calving.

Poultry :

Pullet egg weight of starcross layers were found to be higher as compared to CPF and RVC ones.

October-March period proved to be economic broiler keeping practices due mainly to heavy market demand.

Low repeatability of egg production are conditioned more by environment than to breeding methods for trait improvement.

Gynaecology :

Differences were recorded between the normal and repeat breeder cows in regard to level of Sodium, Potassium, Chloride, Magnesium, total protection and pH of estrual mucus.

Physiology :

Histological studies of pancrease revealed disintegrated islets slowing degenerative changes.

Blood vessels in islets were found to be heavily congested.

Biochemistry :

Concentration of sirum globulim, T.L.C. and P.C.V. were found to be higher whereas sirum albumin and A G. ration, T.R.B.C. and Hb were lower in in tuberenlin positive *cows* as compared to normal.

Microbiology :

Different species of Aspergillus such as *A. fumigalus*, *A. flavus*, *A. niger*, *A. terreus* and *Alternaria sp.* and other yeast and yeast like organisms were isolated from goats.

Paultry feeds, on being examined, contained fungi like, *A flavus*, *A. terreus* and *A fumigatus* 3 such poultry feeds samples screened by TLC were found to be positive for Aflatoxin B

Straw samples were also observed to carry various fungi like *A flavus*, *A. niger*, *Fusarium sp* and *Rhizopus sp.*

A total of 37 isolates of mycoplasma were obtained from cases of infertility and respiratory disorders in cattle and buffaloes.

Pharmacology :

The overall average plasma protein breeding of Oxytetracycline, Ampicillin Penicillin G and Streptomycin was found to be 55.0, 46 0, 41.5 and 30.0 percent respectively.

Parasitology :

Sarcocystis infection in cattle (69.5%) and buffaloes (54.30%) were observed in the slaughtered animals in obbalorius in and around Patna, due mainly to the high population canine and feline hosts in the viscinity of the slaughter houses.

The highest microcysts incidence (39.04%) and macrocysts incidence (22.85%) were observed in cattle as against the respective figures of 32.76% and 16.3% in buffaloes.

Organwise, heart was found to harbour the highest infection rate of *microform* of *sarcocysts* followed by ocular musculature and oesophagus. On the other hand, the *Microform sarcocysts* were highly present in the oesophagus followed by heart and occular musculature in both cattle and buffaloes. Comparatively higher infection rate of *sarcocysts* was observed in right ventricle than in the left ventricle.

The morphological studies on various developmental stages of *S. levinei* and *S. fusiformus* revealed that the shape size of there two *sarcocysts* their sporocysts and bradyzoites were indistinguishable.

Dogs and cats were found to be the final hosts of *S. levinei* when bubaline sarcocystosis was experimentally transmitted to them. This study led to the finding that cattle were found to be parasitisized by *S. cruzi* (Microform) and *S. hirsula* (measoform), while in buffalo it was observed to be *S. levinei* (microform) and *S. fusiformus* (Macroform).

Keeping S. *levinei* infected buffalo that at 65-67°C for 20 25 minutes or breezing it at 4°C for 48 hours. kills the *sacrocysts* completely and thus it is uninfective to dogs and also for human consumption.

Significant level of dermal reactions were observed in cattle and rabbits following the inoculation of tick antingen, as evidenced from inflammatory reaction of swelling. redness, painful sensations at the site of inoculation and general hyper-sensitization of hosts. The local reactions were accompanied with manifold increase in the thickness of the skin just after inoculation. Rabbits were found to be comparatively more sensitive to the inoculation of tick antigen than cattle.

Selection, Evaluation and Improvement of Buffalo for Milk :

Bihar is endowed with rich soil of Genetic planes where 15 million cattle and 4.55 million buffaloes produce nearly 52 lacs litres milk per day. Though buffaloe population is nearly one third (30 %) of cattle, the milk production from buffaloe is to the tune of 55 % of the total milk production in the State

Despite the impressive picture of natural production, there is neither a single recognisable breed nor there is research in buffaloe for enhancing the production and supply of quality bulls so as to be able to cover the entire breedable females of buffaloe population.

Buffaloe females over 3 years in milk, dry and not calved scope for the development of milk production along with the breed improvement programme which drains out lacs of rupees in purchasing non-proven bulls of Murrah type from out side the State.

Picking out the thread from the priority point of view, the Rajendra Agricultural University submitted above mentioned multidisciplinary research project on buffaloe which awaits clearance from the I.C A.R. In the last meeting, the regional committee No. 4 recommended this project to be taken up as an unit of A.C.R P. on buffaloe for milk and for that a Committee comprising of Dr. R. N. Bhat and Dr. R. Nagarcenkar was constituted. The recommendation of the committee is still awaited.

Goats :

Bihar with abounding goat population of 73.6 lacs with almost 90 % of non-descript type requires urgent attention to make the ideal type of animals either suitable for meat or meat and milk, both.

In the light of 64 % of the operational holdings less than one hectare and with large number of landless, marginal and economically weaker farmers, the goats remain their main sustainable source of income.

Keeping the above facts in view, R.A.U. started a goat research programme suitable for the tribal belt of the state which is ecologically different from the Genetic planes.

A pilot survey of the availability and potentiality of goats in Gangetic planes of Bihar indicated that Black B ngal, Brown Bengal and White Bengal goats were in proportion of 44 %, 30 % and 26 % respectively. With respective adult body weight of 21.96 (124), 25.6 (141) and 24 9 (42) kg. Which indicated higher body weight potentiality than earlier reported which varied from 11.15 kg. with 15-20 kg. milk/lactation by different workers.

The Bengal breeds of goats (Black, Brown and White Bengal) being famous for multiple births going up to 77 % producing finest quality chevon among the Indian goat breeds, generally produce three crops in two years with multiplication rate of more than 300 % per year. The goat skin specially of Bengal breeds has also been adjudged to the finest for leather and shoe industry.

Bengal goats, therefore, have a brighter future for meat than milk and a suitable technology for the same, based on scientific experimentation, is urgently required. This view has also been upheld by the National Seminar on the progress of research in Animal Genetics and Breeding held in the year 1978 at N.D.R.I., Karnal. Selection for high reproductive rate, early maturity, prolificacy, facundity and small kidding intervals could be exploited to the advantage of the farmers for whom it would be an economically sustainable profession

A step in this regard could be initiated by establishing goal research centres in rest three agro-climatic zones for Bihar and this could be possible through the liberal aids to this University by the I.C.A.R.

Fish cum livestock farming aiming at to improve the technical know-how of scheduled caste persons :

Bihar is endowed with rich hinterlands for in-land fishery as largest number of ponds and river belt fall in this zone of conutry. For a large of landless fisherman and schedule caste persons, fishery is only livelihood and are engaged in fishing and marketing in inland fishes.

A project entitled "Production, improvement and evaluation of fish under intergrated fish with livestock/poultry farming in Bihar under scheduled caste development programme" has been submitted to the State Government and I.C.A.R. for financial assistance as this aspect of research cum transfer of technology to weaker section of the society needs to be given on priority basis.

Draftability in crossed bullocks :

Bullocks though rapidly being replaced by mechanical power, still froms the main source of draft power for various agricultural operations, including irrigation and rural transport. Consequent upon corssquent corssbreeding, the draftability in XB bullocks suffered due to humplessness and level of exotic inheritance coupled with high respiration rate. In view of increasing rate of crossbred male calves, it has become highly essential to initiate the research project on the draftability of crossbred bullock. The University submitted a a project on this subject and awaiting clearance from the ICAR.

ANIMAL HEALTH

All India Co-ordinated Research Project for epidemiological studies on F.M.D. :

The Co-ordinated unit of I.C.A.R. project has been undertaken to study the epidemiology of F.M.D. with special reference to its etiology mode of outbreaks, virus types and control of the epidemic occurring in this region.

A total of 48 outbreaks were recorded of which 45 fell in rural areas including of the farm animals which were already vaccinated. Of the animals suffered from the infection 14.39% were cattle buffaloes, 0.7% goats with overall morbidities of 7.94% Virus types "O" (37), Asia-1 (16), A-22 (6) and 'A (2) were identified from the clinical samples collected from different parts of the State.

Topographically, North Bihar and Central Genetic Planes experianced more outbreaks than Chhotanagpur area.

Constraints : The existing facility of virus typing is too meagre for effective typing and monitoring on this infectious disease which inflicts heavy loss of production in animals.

Pharmacokinetics of chemothrapeutic Agents with special reference to their distribution in the uterine fluid, milk and blood of she-buffalo :

An ad-hoc research project of I.C.A.R, was undertaken to study the pharmacokinetic parameters of some chemotherapeutic agents (pencillin, ampicillin and oxytetracyclin) in uterine fluids, milk and blood of she-buffaloes.

The plasma protein binding capacity of Oxytetracyclin was found to be highest (55.0% followed by that of Ampicillin (46.0%) Pencillin G (41.5%) and streptomycin (30%).

Studies on the incidence, Epidemiology, Biology and Immuno Diagnosis of Sarcocystis in cattle, Buffaloes & pigs in Bihar :

The ad-hoc project of I.C.A.R. was undetaken with a view to develop suitable technique for in-vivo diagnosis of physical factors effecting survival and infectivity of sarcocystis parasites parasites in meat so as to be suitable for human consumption.

The curde antigens of sarcocystis has been developed which could provide a valuable tool for the immunodiagnostic work on further purification and standardisation. The studies further indicated that cooking and freezing both would be able to help the meat infected with this parasite suitable for human consumption Further studies are in progress.

The ad-hoc project "comparative studies of efficacy of infection, treatment method and tissue culture vaccine against boving theileriasis" has been approved by I.C.A.R. and the work is likely to be taken up soon.

Basic Science and Humanities:

Since the establishment of the College, the departments got actively involved in developing and handling research projects of greater relevance to the Agriculture and Animal Science The main objective of the research activities in the college is to strengthen the basic understanding of the limitations to crop yield and suggesting better technology to improve upon them.

A briel account of the research progress and achievement in Basic Science and Humanities are outlined here as under :

Botany and Plant Physiology :

Under rainfed conditions wheat variety U. P. 262 given seed soaking treatment for 12 hours with sodium benzoate (0.5%), recorded the average yield of 24.15 q/ha as compared to 16.61 q/ha in absolute control (dry seeds). The next better response was with 6 hours, seed soaking in sodium benzoate (1%) followed by its spray (100 ppm) at tillering.

The overall impact of sodium benzoate on the yield was positively towards an increase, which was significantly high in both the varieties. The magnitude of increase in the variety C 336, a relatively tolerant variety to draught and typical variety for rainfed conditions, was low as compared to UP 262, but the sodium benzoate could induce resistance against drought and triggered an increase in yield in this variety too.

Eveluation of relatively thermo-insensitive strains of wheat :

Twelve relatively thermo-insensitive strains, previously screened by the cereal section of R.A.U., Pusa alongwith C 306 were grown under rainfed condi-

tions. Biochemical studies including peroxidase activity, estimation of carotenoids. chlorophyll 'a', chlorophyll 'b', protein and carbohydrate were done, so as to findout whether or not biochemical parameters could be associated with yield or yield contributing characters. The peroxidase activity was relatively high in four varieties viz., J 81-3, C 306, NI 8364 and Sujata, which exhibited high yield. Significant positive correlations were obtained between peroxidase activity and carotenoids; carotenoids and chlorophyll 'a' and Chlorophyll 'b'. Protein content was positively associated with yield which is its contary to normal sown cereal crops. Thus, the present study has revealed the significance of the parameters analysed in breeding thermo-insensitive varieties of wheat.

Isolation and purification of some potential herbicides:

An attempt was made to isolate and purify the active principle of *Eichornia sp*, so that it can be used as a natural herbicide. Employing solvent extraction and chromatographic techniques, a mixture of 4-6 compounds has been partially purified which gave a positive herbicidal response in bioassary against the test weed *Amaranthus spinosus*. It is expected that some secondary metabilities like phenols are responsible for potentiality of the mixture.

Evaluation of growth regulation activity of allelochemicals :

Various allelochemicals were tested for their growth regulating activity. Out of 15 chemicals tested X 2, X 7. X 8, X 12 and X 13 were found very potent against the test plant and almost all completely inhibited the germination of the test weed *Amaranthus spinosus* at a concentration of 0.03%.

Evaluation of fungicidal potential of Allelochemicals.

The fungicidal activity of allelochemicals was determined and it was found that AL_1 and AL_2 completely inhibited the growth of *Helminthosporium oryzae* at a concentration of 0 095% and 0.037% ond of *Alternaria solani* at 0.05 % and 0.033% respectively.

Determination of the Physiological limitations to grain yield in maize by source-sink ratio alterations.

Defoliation and kernel removal treatment involving assimilate supply reduction and enhancement, reepectively were applied in two maize genotypes-Hi-Strach and Diara during early and late kernel development phases.

The results indicate that :

(a) Early reduction of assimilate supply (12 days after mid-silking) substantially reduced the number of kernels per ear in both the varieties, suggesting the great dependence of kernel number per ear on assimilate availability.

(b) Enchancing assimilate availability (12 days after mid-silking) per kernel removal treatment had little effect on kernel weight of the genotype Hi-Strach.

In the genotype Diara, however, the kernel weight increased in early kernel removal treatment, while the late kernel removal (26 days after-mid-silking) treatment had relatively little effect. It is inferred that the assimilate supply to the grains constitutes the main limitation in realizing high economic yield in the genotype Diara, thus, for this variety methods either through breeding or chemical treatment, involving high transport of metabolites shall have to be devised.

Physiological basis of yield difference in Rape and Mustard.

In Variety RAUDT-I, the mean values indicated an increase in seed weight per plot by 10.3% in crops defoliated from the base and by 31.2% in those defoliated from the top and likewise there is an increases in the biomass per plot by 23.3% in the crop defoliated from the base and by 38.8% in those defoliated from the top, 15-days before anhesis.

In Var. Jathi Rai also, there is an increase in the yield components in crops defoliated 15 days before anthesis as compared to the control with no defoliation and the magnitude of difference was too high. The increase in total seed weight per plot was by 73% in those defoliated from the base and by 53.6% in those defoliated from the top.

Physiological basis of hybrid necrosis in wheat.

The variety C-306 falls in Ne_1^S and S 308 in Ne_2^S and therefore hybrids are necrotic in F_2 resulting in their death. Such barrier needs to be broken, so as to get an ideal cross resulting in segregated populations in F_2 which would develop into a hybrid with typical rainfed characteristics of C-306 and high yielding characters of S-308 with greater adaptibility. The spray of 3% proline at 10,20 and 30 days after pollination on variety S-308 having pollen dusting from C-306 resulted in the hybrid with pubscent glumes, high tillers numbers (28) with increase in grain weight (36.46) gm. 1000 grain weight). The character of the segregating populations will be observed under rainfed and irrigated conditions to study their behaviour and yield potential. This study is being carried out in collaboration withe IARI, Botanical Station, Pusa.

Genetics :

The department of Genetics has been d ing research on (i) Wheat (ii) Potato (iii) Rice (iv) *Rhoeo* (v) Rhizobium (vi) Legumes (vii) Drosophila (viii) Effect of Surfactants/detergents and (ix) Tissue culture.

In Biometrical studies of yield of hexaploid wheat, fresh cross combinations were made The seeds would be utilized for raising F_1 generation. Under the programme evaluation of relatively thermo-insensitive varieties of bread under rainfed condition, 13 varieties including C-306 (c) were grown. Observations were made on various quantitative as well as biochemical traits. Varietal differences were found to be significant for all the quantative characters studied. Considering yield, Sujata and C-306 were found to be at par. Cross combinations were made

in the project "Exploitation of *T. sphaerococcum* and *T. compactum* as source of resistance to lodging". F_1 seeds were raised for subsequent studies, Various Hexaploid and Tetraploid species of wheat were grown, relevant observations recorded with the long term objectives of initiating interspecies crossing for genetical analyses. The results would also be used for breeding programme. In the new programme of evaluation of elite *T. durum* varieties, germination and stand were to be good under Pusa conditions. BR 1011 a variety of wheat evolved by this department in collaboration with the department. Plant Breeding has been included in the All India-Co-ordinated Wheat Trial and the variety would be tested under rainfed conditions on the various station of North East Plain Zone in the rabi season of 1984-85.

Two experiments on potato were conducted at Pusa. K Badshah and K Sindhuri were found to be the highest yielders, although genotypes, PC 4998, PC 46, PC 605, K Lalima and K Deva were at par in tuber yields. In another experiment thirty cultures generated/collected were assesed alongwith eight released varieties of potato. Variations in phenolic contents in potato genotypes stored at room temperatures were also recorded.

In respect of rice, the department is working on scented rice project in collaboration with Rice Breeding group of the university. In an evaluation of comparative performance of aromatic selections-Varietal differences were found to be significant. However, none of the entries could out yield the superior check, Ratna. In Slender Grain Varietal Trial, 26 entries including BR 9 and BR 10 were tested Varietal differences were significant. Maintenance and evaluation of scented rice germplasm, hybridization programme for genetical studies vis-a-vis improving quality of scenred rice, and selection of dwarf plant type from BR 34 BLB resistant line from Janki by Mutation Breeding were in progress.

In a continuing project, Somatic metaphase chromosomes of the pollen grains of *Rhoeo discolor* Hance, have been utilised for an attempt to introduce *acetocarmine* bands. A reproducible method of obtining good metayhase plates has been developed. Preliminary experiments indicated that this method could be used for agriculturally important crops also. Various band inducing procedures have so far resulted in inconsistent banding. Other methods, including orecinbanding, would also be tried. Further, the department of Genetics has embarked upon a new research project to gain an insight into the genetic mechanism of salt tolerance in *Rhizobium legumnosarum* so that high saline tolerance and N_2-fixing ability could ce combined. As a first step, some strains capable to grow at 5 % Nacl concentration have also been isolated. There are indications that salt tolerance may not be chromosome borne. Genetics of Rhizobium, legume interaction under salt stresses have of late attracted our attention. It is proposed to use lentil and chickpea as test meterial. Preliminary studies reveal that certain lentil X Rhizobium combinations are worth consideration.

In a continuing project on Drosophila, locally available wild populations of *D. melanogaster* were maintained for 5 generations, in order to attain population homozygosity. Further they were screened for mutants with various morphological traits. The population have been found to be highly stable for eye colour, wing size and bristles. This culture would be utilized for screening various agrochemicals for their potential as cytogenetic innovators. Effect of various surfactants/dertergents was studied in Moong on germination, growth parameters and mitosis in order to understand the role of these surfactants on the living system.

Tissue culture work has been initiated with *Solanum xanthocarpum*. Callus formation from most of the plant parts such as leaf, stem, root and another differentiation of plantlets from callus and direct regeneration of plantlets from leaf, stem and anther have been successfully achieved. The generation of plantlets from callus under NaCl stress condition is likely to enable us to standarise techiques for application to important crops.

Biochemistry :

Biochemical basis of wilt resistance in chickpeas :

The project taken up with the department of Plant Pathology is aimed at developing a simple biochemical test/tests for distinguishing between wilt resistance and susceptible varieties of chickpea, to provide a biochemical/molecular reasoning for their relative behaviour towards the pathogen *F. oxysporum f. sp. ciceri*. The results obtained indicated a direct association or correlation of the wilt resistance with high phenol content and peroxidase activity. The varieties studied were WR-315 (resistant), Plant C-114 (tolerant) and JG-62 (susceptible). The observations were made at different stages of the life cycle of the chickpea and different tissues were scrutinized for phenol content and enzymatic activity.

Studies on the regulation of development of amylolytic and proteolytic activies in germinating chickepas.

This project was aimed at studying the control exercised by embryonic axis, gibberellic acid and end products on the development of the amylolytic and proteolytic activities in germinating chickpea. The results have indicated that the feedback inhibition may not be a mode of control and regulation of these enzymes. The study lasted for 6 days and the samples etc. were taken and analysed at an interval of 24 hours.

Biochemical analysis of flag leaves of thirteem thermosensitive varieties of wheat at the stage of milk formation.

The wheat varieties were analysed at milk formation stage for chlorophyll *a*, *b*, carotenoides, reducing sugars, total phenol, soluble proteins and peroxidase

activity. However, no relation could be established between the yield and the parameters studied. Most likely the overall yield depends upon a number of factors working in unison and therefore, a more broad-based approach has to be adopted for elucidating a viable correlation.

Biochemical aspects of growth and differentialion in the root and shoot tissue culture of *S. xanthocarpum* under salt stress.

The differentiated and undifferentiated calli of *S. xanthocarpum* were analysed for their peroxidase activity, soluble protein contents and total phenols. Salt stress was created by growing the tissues at 0.1, 0.5 and 1 % concentration of NaCl. The result, though needs further analyses points towards a definite variation in the parameters studies in root and shoot tissues and in normal and salt-grown calli.

Biochemistry of seed priming by micronutrients-Chickpea seeds were primed with Zn and Cu ions and allowed to germinate under water stress, The primed seeds performed better than the unprimed seeds as far as the parameters studied are concerned. The analysis of germinating seeds (cotyledons and embroyonic axes) for various components and enzymes is in process but initial results do point to the fact that primed seeds are better placed in terms of viability, growth etc.

HOME SCIENCE

Infant feeding practices in Rural areas (District : Samastipur)

It is a known fact that the fnfant mortality rate (10 out of every 100 live birth) is high in India. They die within a month of birth. This is mainly due to decline in the breast feeding which has led to an increase in causing malnutrition, diarrhoea, tetanus, respiratory infection etc.

A survey has been started to know the present trends about mother's knowledge and attitudes towards breast feeding.

The investigators have been appointed to carry out this study. They have been given training for two weeks. With the consultation of the statisticion, the mother's having an infant upto 12 months have been selected randomly from the District of Samastipur. The blocks of Samastipur district is grouped into four zones that is one village in each zone is selected randomly. Out of which five clusters of villagers in each has been formed including the other 5-6 adjecent villages. Two blocks (Vibhutipur and Kalyanpur) is selected having 4 main centres and about 15 villages. Vibhutipur for I.C.D.S. Centre and Kalayanpur block for non-ICDS has been chosen for this study.

The work has alreay been started in Kalayanpur block and adjacent 15 villages. Around 100 mother's having an infant upto 12 months are interviewed by the trained investigators with the help of schedule method for data collection.

EXTENSION EDUCATION

Extension Education is one of the three important activities of the University along with teaching and research with the primary objective of communicating latest useful researches to the larger number of farming community at a faster rate. With this end in view number of programmes were developed and implemented around different campuses and research stations of the University. Some of the programmes were as per scheme of ICAR which provided financial support for implemention of these scheme. The emphasis under different programmes has been on small and marginal farmers and weaker sections and neglected areas so that it served as a model for ameliorating their condition for the state of Bihar.

The extension approaches mainly centred around on organising training programmes for farmers, developing local leadership, conducting demonstrations on farmers' fields and organising field days thereon, organising regular visit of scientists to the villages, publishing popular extension literatures on package of practices of different crops, arranging technical communication through All India Radio and Television. The subsidy and free supply of inputs to the adopted families under various programmes were given to the minimum. The subsidies and free supply of critical inputs were given only in case of adoption of new technologies. The main emphasis was on intrensic motivation rather than extrensic motivation. The students of different localities were also involved in village extension work under N.S.S. and field extension practicals. The approaches to develop extension programmes comprised organisation of village level meeting for discussions with farmers. The Scientists of different departments participated in the village level meengs and discussion for developing extension programmes. The enterprising unemployed youths of the adopted villages were encouraged to start input sale centres to provide requisite inputs to the fellow farmers in time. The Agricultural input fortnights were also organised in the villages. Some of the significant achievements under various programmes are as follows :

Training Programmes :

Training remained one of the most important extension education activities of the Directorate of Extension Education through which efforts were made to strenghen the transfer of technology. Some of the important training programmes organised during the year were as follows :

(a) Inter-State Training cum-Discussion Seminar on unconventional crops (Tapioca, Tubers crop etc) sponsored by the Directorate of Extension Training,

Ministry of Agriculture, Govt. of India was organised at Pusa from March 19 to 26, 1984 in which 25 extension officers from Karnataka, Madhya Pradesh and Bihar State participated.

(b) Training-cum-Discussion Seminars on Rabi Pulses (with emphasis on Gram) and summer pulses production technology sponsored by the Dalhan Vikas Nirdeshalaya, Lucknow (Govt. of India) was organised from 28.9.83 to 30.9.83 at Bihar Agricultural College, Sabour and from 21.2.84 to 22.2.84 at Pusa respectively. 52 Extension Officers of the Department of Agriculture, Bihar participated in the training programme.

(c) Training-cum-Discussion Seminars on Summer/Deep water/Boro paddy and Kharif rice production technology sponsored by the Directorate of Rice Development (Govt of India) were organised at Pusa (30.1,84 to 2.2.84(, Sabour (22 2 84 to 25.2 84) and Patna (6.2.84 to 9.2.84) in which 70 extension officers of the Department of Agriculture were imparted training.

(d) Training Programmes on Kharif Maize production Technology sponsored by Directorate of Maize and Millet Development (Govt. of India) were organised at Pusa (9.5.84 to 12.5.85) and Dholi (28.5.84 to 31.5.84) campuses. Rabi Maize production technology training was also organised at Dholi from 9.7.84 to 12.7 84. Two Ragi and Minor Millets production technology trainings were organised at TCA, Dholi and Pusa campuses from 1.6.83 to 4.6.83 and 2.5.84 to 5 5.84 respectively. Extension Officers of Agriculture Department were imparted training by the concerned scientists of the University.

(e) Training Programme on Wheat production technology sponsored by Ministry of Agriculture, Govt. of India was organised at Pusa from 26.9.83 to 29.9.83 in which 30 Extension Officers of Department of Agriculture, Bihar participated.

(f) An Orientation Training for Farm Inspectors of different farms of the University was organised at Pusa from 7.6.83 to 9.6.83 in which practical guidelines for working in the farm and its management. crop production, dairy and poultry management and seed production technology were discussed in detail.

(g) A Training Programme for Assistant Agronomists working in Adaptive Research Programme under Training and Visit System was organised at Pusa from 11.4.83 to 13.4.83 in which scientist of the University imparted training on lay-out techniques and different experimental designs for conducting successful adaptive research trials,

(h) Role Orientation Training for the Officers of IFFCO was organised at Pusa on 7th November, 1983 in which 27 officers of IFFCO from different parts of Bihar participated. This training was planned with special emphasis on analysis of field problems and role playing in the field.

(i) Training for Officers of State Bank of India was organised at Mithapur Farm, Patna to acquaint the field officers of State Bank of India regarding recent technologies for increasing agricultural production and animal husbandry.

(j) Scientists of Agronomy, Economics, Statistics, Soil Science and Water Management Depa tments of the University delivered their lectures in training programmes organised at Water and Land Management Institute, Khagaul from 26 4,84 to 9.6.84.

(k) Farmers' Training Programme :

(i) Training for farmers adopted under Lab-to-Land Programme at Pusa-Dholi, Sabour, Patna, Katihar, Madhepura, Araria, Munger, Banka, Adhaura and Bikramganj campus were organised by the concerned scientists of the University in which about 2000 farmers were imparted triaining on crops production technology, Animal Husbandry, Bee keeping etc.

(ii) About 260 farmers were imparted training in areas of goat keeping, piggery keeding, poultry farming and general animal health covering better management and feeding.

About 100 farmers of Sone Command Area were imparted training by the crop specialists of Mithapur farm about recent technology for increasing agriculture production in Sone Command area.

Seminars on Maize, Tuber and Oilseed crops organised by the IFFCO were attended by the concerned scientists of the University in which about 1150 farmers participated.

A "Sona Khad Diwas" organised by Steel Authority of India was attended by the scientists of the University in which about 150 farmers were imparted training on crop production technology.

Training Under World Bank Extension Project.

Monthly Workshop-A two days monthly workshop for the subject matter specialist and senior extension officers working uuder training and visit system in different parts of Bihar was regularly organised at Pusa, Patna and Sabour campuses. On the first day, field problems of farmers were discussed thoroughly with the Master Trainers of the University and on concluding day formulation of messages was made in the form of a hand-out in Hindi and distributed among the participating extension officers.

Lead Workshop on T & V System-A special workshop under Work Bank Extension Project (T & V) was organised at Pusa from 5.3.84 in which senior Master Trainers of Pusa. Patna, Ranchi and Sabour campuses, subject matter specialist (T & V) District Agricultural Officers and senior Extension Officers

took active part. The workshop was conducted under the guidance of World Bank member, Sri K. Sreekantiah and Mr. M. Bextor from new Delhi.

Workshop on Orientation, Communication and Extension Teaching methodes-A special workshop on orientation, communication and extension teaching methods was organised at Pusa from 2.4 85 to 9.4.84 for the subject matter specialists working under T & V system of Saran and Tirhut Divisions of Bihar by the Training experts from Extension Education Institute, Nilokhori, 40 extension officers were imparted practical training in handling of audio-visual aids, making posters, charts, photography etc.

KRISHI VIGYAN KENDRA

Munger—The Krishi Vigyan Kendra has been organising training programmes for farmers, farm women, farm youths, school and college students and extension workers. In order to farmulate need based courses, village and family surveys were conducted. Emphasis was given on organisation of skill oriented traiuing programmes.

Agronomy-Training programmes were organised on production technology of paddy, Maize, Wheat, Oilseed and Pulse crops with emphasis on critical operations like seed treatment, nursery preparation, fertilizer management and plant protection measures.

Horticulture trainings were organised on package of practices of Mango, Litchi, Guava, Banana, Papaya and Vegetables crops such as Tomato, Brinjal, Cauli-flawer etc.

Home Science-Training programmes were organised on preservation of fruits and vegetables, child care, knitting etc.

Agricultureal Engineering-Trainings In repair and maintence of diesel and electric pumps, use of improved agricultural implements and plant protection equipments were organised.

Animal Husbandry-Training programmes were organised on poultry aad goat keeping and common diseases in cattle and poultry and their teatment.

The disciplinewise number of training programmes organised and number of farmers trained are as follows :

Duration	Agronomy		Horti-culture		Animal Production		Home Science		Agril Engg.		Total	
	a	b	a	b	a	b	a	b	a	b	a	b
1 day							2	15	3	36	7	85
On campus	1	18	1	16	–	–	4	38	2	44	8	107
Off campus	–	–	1	10	1	15						

2-6 day												
On campus	7	34	7	34	1	28	3	27	3	75	21	198
Off campus	–	–	3	18	–	–	–	–	1	18	4	36
2 weeks												
On campus	4	4	4	40	–	–	–	–	3	40	11	120
						Total :–					51	546

(a) No. of course conducted, (b) Total no. of farmers participated.

Training programmes conducted in collaboration with Indo-British Fertiliser Education Project.

Discipline	No. of course	No. of trainees	Courses taken
Horticulture	5	172	Fruit growing, Bio-fertilizer applications of fertilisers in vegetables crops.
Do	1	46	Kitchen gardening.
Agronomy	2	111	Seed treatment, fertiliser management, oilseed and pulses production.
Agril. Engg.	5	215	Use of improved agril. implements dry land farming equipments and water conservation techniques.
Animal Science	1	81	Diseases of poultry birds.
Home Science	1	31	Preparation and preservation of Tomato Ketchap.
Do	6	80	Preparation of Jam, Squash, vinegar, nutritious diet, preparation of maize-biscuits.
Total :	21	686	

Thus, the centre organised 72 courses and trained 1232 farmers in different skills, which created a good impact in the areas from where the farmers had come.

Krishi Vigyan Kendra, Banka—The following training programmes were organised by K. V. K., Banka during 83-84

Manth	Name of Villages	No. of farmers trained	Course covered
On campus :			
Sept. '83	K. V. K., Banka	43	Crop husbandry
Feb. '84	Do	12	Do
March '84	Do	12	Animal husbandry

Off campus :

June '83	Dauna, Kalagour, Pathardih.	43	Dry land farming
July '83	Dauna, Rakipathar	39	do
Aug '83	Darhabari, Bhandari chak	32	Dry land farming, Plant protection in paddy.
Sept. '83	Jagatpur	71	Home Science (Care of child)
Oct. '83	Kakwara, Jagatpur	40	Crop husbandry
Nov. '83	Oumeri	26	do
Dec. '83	Ajitnagar, Setalpur Chutia, Thirwa.	55	Animal husbandry
Jan. '84	Ajitnagar, Maharpur	25	do
Feb. '84	Marjlishpur, Meharpur, Jhetalpur, Jitarpur.	86	do
March '84	Sutpur, Jamna, Sitapur Moharpur, Rampur, Harpur.	46	Crop & Animal husbandry.

OPERATIONAL RESEARCH PROJECT :

Munger (Diara Area) :

The achievements of Operational Research Project in Taufir Diara (Munger) have made a great impact on the Diara cultivators and they have adopted the cultivation of high-yielding varieties of different crops. Practices in respect of scientific cultivation advocated by the project were : cropping pattern experiment based on summer maize and paddy, irrigation requirements of maize, wheat and potato, demonstration on irrigated and unirrigated wheat, iong duration maize, composite demonstration of Rai, plant protection trial on wheat (HP-1102), Barley (K-125), Gram (C 235) and Kadu. As a result of intensive transfer of technology programme carried out by the scientists of the project, the adoption of improved technology has spread in the area as per details given below :

(a)	Winter maize consisting of varieties Hi-starch, Laxmi, Pioneer & Suwan	—	140 hectares
(b)	H.Y.V. Wheat viz., HP-1102-, HD-1553, RR-21 & UP 262	—	1820 ,,
(c)	Varuna Mustard	—	470 ,,
(d)	Gram (c 253)	—	144 ,,
(e)	Pea (BR 78)	—	50 ,,
(f)	Summer maize (Diara composite)	—	550 ,,
(g)	Summer Paddy	—	7 ,,

NATIONAL DEMONSTRATION PROGRAMME :

Samastipur :

During the year 1983-84, altogether 20 demonstrations were conducted. Nineteen demonstrations were on two crop sequence including five on Entire Farming System (EFS) and one as a special demonstration on problemetic soil.

The blockwise distribution is given below :

Sl. No.	Name of Blocks	No. of demonstration conducted		
		Two crops	Special	Total
1.	Pusa	9	—	9
2.	Kalyanpur	7	—	7
3.	Samastipur	—	1	1
4.	Ujiyarpur	1	—	1
5.	Sarairanjan	2	—	2
	Total	19	1	20

★

The varietywise number of demonstrations conducted during Kharif and Rabi seasons as well as highest, lowest and mean yields obtained are presented in following Table ;

Name of Crops	Variety	No. of demonttration	Yield q/ha		
			Highest	Lowest	Mean
Kharif :					
Paddy	Rajendra-201	9	44.00	34.00	38.11
	Saket-4	3	38.50	29.50	33.50
Maize	Suwan-5	5	24.50	20.00	22.75
	G.S.-2	2	22.00	21.75	21.87
G. nut	M-13	1	28.70	28.70	28.70
Rabi :					
Wheat	Hp-1102	4	41.00	38.50	40.12
	PH-1209	3	42.00	38.75	40.91
Maize	Hi-strach	7	63.00	59.00	61.14
	Laxmi	4	60.00	57.00	58.62
Rai	Varuna	2	10,50	9.75	10.12

Field days—During Kharif and Rabi seasons altogether 16 field days were organised in which about 200 farmers participated during various operations such as application of zinc sulphate, sowing of ground nut, application of pesticides as well as test harvest of the crop.

☆ The districtwise mean, highest, lowest yield and return over operating cost Rs/ha of these demonstrations are presented in following Table :

Rotation	No. of demons-trations	Mean	Highest	Lowest	Cross	Cost of produc-tion	Return over operating	N	P_2O_5	K_2O
Paddy-Wheat	4	76.00	82.00	72.50	15200.00	9100.00	6100.00	160	120	60
Paddy-Maize	8	97.50	104.00	86.50	17062.00	9350.00	7712 50	150	100	70
G. Nut.Wheat	1	28.70	28.70	28.70	24745.00	8200.00	16545.00	100	70	50
		42.00	42.00	42.00						
Maize-Maize	3	81.83	84.75	79.00	14630.00	7540.00	7090.00	120	75	60
Maize-Rai	2	22.75	23 50	22.00	8112.00	4450.00	3662.00	150	80	70
		10.12	10.50	9.75						
Maize-Wheat	2	63.75	65.50	62.00	1248.50	6825.00	5662.00	160	80	60

Bhagalpur :

During 83-84, altogether 23 demonstrations were conducted in 10 C. D. Blocks in Bhagalpur district out of which 8 on two crops sequence, 5 on three crops sequence including 5 Entire Farming System, 9 on dry land agriculture, and one as a special demonstration on reclamation of saline soil.

Nome of Block	No. of two crop demonst.	No. of 3 crops demonst.	No. of dry demonst.	No. of special demonst.
Baunsi	—	—	4	—
Banka	2	2	3	—
Katoria	—	—	2	—
Jagdishpur	—	1	—	—
Belhar	1	—	—	—
Shahkund	—	1	—	—
Sabour	4	—	—	—
Dhoria	1	—	—	—
Kahalgaon	—	—	—	1
Rajoun	—	1	—	—
Total :	8	5	9	1

Field days—Twenty numbers of field days were organised in which about 220 farmers participated in various critical operations duch as application of $ZnSO_4$ in rice, application of herbicide and pesticides, sowing of groundnut as inter-crop and crop cutting of National Demonstration Plots. Due to high yield of groundnut in demonstration plots, the farmers were very much interested to grow groundnut and this crop being a new crop for the area was grown in 16 acres in neighboring villages.

The variety wise number of demonstrations conducted during Kharif, Rabi and Summer and highest, lowest and mean yields obtained are given in the follo-wing Table. :

Nome of crops	Variety	No. of demonstation	Yield in q/ha Highest	Lowest	Mean
1. Rice	Rajendra-201	3	45.20	40.20	42.46
	Sita	8	43.80	12.50	36.76
	Radha	1	7.20	—	7.20
	Monosoore	1	39.60	—	39.60
2. Wheat	HD-1553	2	46.44	26.00	36.22
	HP-1102	2	38.02	35.59	36.80
	HP-1209	1	37.80	—	37.80
	Sonalika	1	41.50	—	41.50

3. Gram	C 235	2	17.50	16.20	16.85
4. Maize	Laxmi	1	—	—	—
5. Rai	Varuna	3	11.30	6.10	8.56
6. Barley	Karan	1	15.40	—	15.40
Dry Land :					
1. G. Nut	AK 12-24	3	5.80	2.40	4.50
	M 13	5	8.60	3 85	6.61
2. Maize	Suwan	4	11.00	3.50	8.05
3. Arhar	BR-65	5	7.20	4 00	6.90
4. Marua	RAU-8	2	11.00	8 60	9.80
5. Tori	UP-70	2	7.20	6.50	6.85

A large area of saline patches were observed aronnd Ekchari village in Kahalgaon Block and so on the basis of soil test, Pyrites at the rate of one tone per hectare was applied.

PUBLICATIONS :

The Directorate of Extension Education continued to publish a large number of literature for the benefit of farming community and extension workers,

(a) Adhunic Kisan :

Four thousand copies of "Adhunik Kisan" a poular monthly magazine is published regulary by the University. Its demand is increasing. At present there are 3643 subscribers to the magazine.

During the year 1983-84 several special issues of "Adhunic Kisan" were brought out. There were :

(a) Bio-gas Vishesank— Feb., 1983
(b) Kharif Masala issue (spices)— June, 1983
(c) Sabjee Vishesank (Vegetable)— Oct., 1983.

Adhunik Kisan Dairy :

During 1984 ten thousand copies of diaries were published and sold among the farmers and field functionaries.

Following pamphlets/bulletines were also published during 1983-84 for distribution among the farmers and trainers during Kisan Mela, Kisan Diwas, Kisan Gosthi and field programmes organised by the University.

(a) Hindi ki kheti
(b) Adarakh ki kheti
(c) Ajamain ki kheti

(d) Garma Dhan ki kheti

(e) Dhan ki Pramukh Fashlen

(f) Kharif Dalhan ki kheti

(g) Garma Moong ki kheti

(h) Mishrikand ki kheti, etc.

The University also contined to publish

(a) Rajendra Agricultural University Research Journal

(b) Rajendra Agricultural University News letter.

The University has its own press located at its Dholi campus which helps in bringing out above publications as well as printing of various forms, etc. required by the University.

SCHEDULED CATES DEVELOPMENT PROJECT (ICAR)

The Rajendra Agricultural University in an effort to bring economic transformation amongst the weaker section of the society is implementing an ICAR sponsored project on Scheduled cate with 476 families of Samastipur district. Villages from Pusa and Kalyanpur blocks were selected for the project work. The Bench Mark Survey were completed which indicated that 47.46 per cent of the families under the project belong to 'Dusadh', 'Dhobi', 'Pashi' and 'Dom'. It was further observed that 57.96 per cent family under the project are landless, where as only 35.62 per cent have land upto 0.25 hectare. It was found that about 77.91 per cent of the families under project belong to agricultural labourer class and only 5.67 per cent depends upon agriculture for their livlihood. However, 16.38 per cent are mainly dependent upon other sources of income. The income generating interest areas of the target group were also ascertained at the time of survey. It was found that 101 members of target group are interested in rope making in order to subtantiate their income. This is followed by poultry and bee keeping

The following programmes were undertaken under the project.

Farmers of Mahamada growth centre were imparted training on wheat production technology. Emphasis was laid on non-monetary imputs timely sowing, depth of sowing, spacing and suitable varieties. In Rampura village, farmers were motivated to plant cross-4 variety of Sweet Potato. Home Scientist visited Jitwaria and Rampura and motivated the families towards personal hygine and sanitation

Distribution of Inputs : In order to encourage cultivation of moong and urd in the project area the following quantities of seeds ranging from $\frac{1}{2}$ kg to 2 kg along with culture were distributed among the members of the target groups.

Crops and variety		Quantity
Moong NP 28	—	50.00 kg.
Moong NP 18	—	50.00 kg.
Moong K 851	—	5.00 kg.
Pusa Baisakhi	—	29.00 kg.
Urd T 9	—	50.00 kg.

In an effort to develop affective linkage with development agencies, Informal meeting with the Prakhand Vikhand Vikas Padadhikari, Block Agriculture Officer and V.L W. 's were held and requested to give special attention on backward communities.

7. INTEGRATED RURAL DEVELOPMENT PROGRAMME

Under this progrmme, different campuses of the University have been selected some villages near their campuses with an object to double the yield of the crop of the farmers. Following are the achievements of different campuses during 1983-84.

Sabour campus–Bihar Agricultural College, Sabour has started this programme in English, Farka, Rajpur, Bahadurpur and Ibrahimpur under Special Extension Block, Sabour.

Crop demonetration

Crop	No. of demonstration	Yield (q/ha)	
		Highest	Lowest
Paddy	17	44.13	18.4
Gram	1	11.05	—

Tree Plantation

Following plants were planted during 1983-84 in IRDP villages.

Name of Plants		No. of plantation
Mango	—	2804
Lemon	—	770
Litchi	—	256
Papaya	—	10018
Banana	—	1000
Sharifa	—	12
Bel	—	55
Guava	—	73
Ornamental plants	—	187

Soif testing

215 soil samples were taken from the filds of adopted farmers and on the basis of soil test report, use of fertilisers were advised.

Bio-gas

One Janta bio-gas plant was installed as a demonstration in English village at the cost of Rs. 5,025 37 in the premises of scheduled caste family, named Sidhu Paswan.

Co-operative

Rs. 11,750.00 as Co-operative loans were distributed among 31 adopted Farmers

Dholi campus

(i) Crop demonstrations

Kharif	Rabi	Summer
Paddy-116	Wheat-40	Moon-75
Maize-25	Maize-18	Urd-35
Pulses-3	Pulses-131	
Oil seeds-7	Oilseed-197	

(ii) Scientists visits were organised to provide "on the spot" technical guidence to the farmers.

Tree plantation

5,517 plants were distributed and planted in nine villages.

In Patna, three villages viz: Nawada, Gaunpur & Dhibra were selected and the work remained in progress with 1360 families. These farmers were given technical guidance, training on A. H. and Veterinery.

NATIONAL SERVICE SCHEME

Dholi campus–The National Service Scheme is in operation in 9 adopted villages of Muraul Block around Dholi campus. 131 students including 5 girl students were registerd as regular N.S.S. volunteers against the sanctioned strength of 100 volunteers.

A prief seport of the various achivities carried out under N.S.S. is as follows.

The social and agro-forestry programme was launched in villags Ithaha and altogether 1925 saplings of Sesum Palas, Goldmohar, Mahua etc. were trans-planted by the students, teachers and village youths. Students also constructed 235 mounds around the village tank for plantiong saplings.

Students actively assisted in drawing farm production plans for 73 adopted farmers of village Itaha and helped in procurement of various agricultural inputs especially seeds of high.yielding varieties.

Students participated in field demonstration on groundnut (M-13, AK-12-25), Mustard (Varuna), Summer moong (Pusa Baishakhi, Sona), Arhar (Bahar) and other crops in collaboration with other schemes.

A three months training programme for fruit preservation was organised at village Itaha where squash, jelly, jam and murabba making was learnt by 28 members of the Mahila Mandal for their domestic purposes.

In collaboration with Gramin Vipanan Kendra, six months tailoring and garment making training programme was organised from Oct. '83 to March '84 in which 50 women (Itaha, Raini Mapusad, Lautan villages) participated and successfully completed the course conducted trained teachers.

A compaign for papaya cultivation was launched in the adopted villages. Twenty five farmers were given the technical know-how and do-how for modern papaya cultivation. About 5.500 saplings of Pusa Delicious, Pusa Dwarf and Pusa Giant varieties were distributed in collaboration with scientists of IARI Regional Station, Pusa to farmers and plantation in about 1.6 hectares was supervised.

Kisan Mela :

The Kisan Mela was organised from 3rd to 5th Feb. '84 at Sabour campus, from 17th to 19th Feb. '84 at Patna campus (Mithapur farm) and from 22nd to 24th Feb. '84 at Pusa campus. The number of farmers visitting Kisan Mela at different campuses were : Sabour (5,000), Patna (850) and Pusa (15.000). Seeds were sold worth Rs. 36318.00 and extension publication worth Rs. 2946.00 in the Kisan Mela. 166 soil samples brought by farmers were analysed and recommendation regarding use of fertilizers were given to the farmers. 55 diseases and pest infested samples of plants brought by farmers were diagnosed and suitable control measures were explained to the farmers.

Agricultural Exhibition :

The University participated in the exhibition organised from 14th to 27th Nov. '83 in the Indian Internation Trade Fair at Pragati Maidan, New Delhi and from 6th to 8th Dec. '83 at Sonepur on the eve of Kartik Purnima of at Vaishali from 24th to 26th April '83 on the eve of Vaishali Mahutsav, and a number of local fairs and exhibition were also organised.

Supply and services :

In order to supplement the transfer of technology programme the University has undertaken supply and services in a limited way. In this context, the following inputs were sold at different Input Sale Centres during 1983-84.

Input Sale Centre :

Patna :

Inputs		Amount
Publication		Rs. 4,502.00
Fertilizers		Rs. 97,858.00
Seed		Rs. 43,695.00
	Total :	Rs. 1,46,055.00

Sabour :

Fertilizers	Rs.	1,92,162 09
Insecticides	Rs.	12,170.79
Seeds	Rs.	14,480.26
Total :	Rs.	2 18,813.14

Misellaneous :

Adhunik Kisan Diary	Rs.	7,209.90
Publication	Rs.	237,00
Total :	Rs.	7,446.90

Testing of Soil, disease and Pest samples :

The total number of soil samples analysed at different campuses were : Patna (779), Dholi-Pusa (147) and Sabour (3804), 44 disease infested and 55 pests infested samples of plants were analysed and control measures were suggested to the farmers.

Supply of culture :

The University supplied Rhizobium culture for different pulses crops from Dholi centre and Blue green algae from Sabour centre. Five thousand packets of Algae culture were sold during 1983-84 from Sabour centre.

Sale of Grafts and Gooties and fruit products :

Sabour is an important centre from where fruit grafts and gooties specially mango are supplied to different parts of Bihar as well as outside Bihar. During 1983-84 sale of grafts and gooties and fruit products were as follows :

Sabour centre :

Grafts and Gooties	Rs.	71,428.89
Fruit products	Rs.	22,540.47
Dholi centre :	Rs.	9,817.00
Total	Rs.	1,03,786.36

Lab to Land Programme :

The Programme for transfer of proven and viable technologies from laboratories to the farmers' fields popularly known as "Lab to Land Programme" was launched in Rajendra Agricultural University, Bihar with 2,000 farm families spread over different parts of the State through its three Colleges and Regional Research Stations and sub-stations.

The centre-wise districution of farm families during the current year are as follows :

Tirhut College of Agriculture, Dholi	650
Sugarcane Research Institute, Pusa	50
Sabour Campus :	
(a) Special Extension Block (Sabour)	250
(b) Operational Research Project in Diara Area, Munger.	200
(c) Jute Research Sun-Station, Katihar	70
(d) Irrigation Research Station, Madhepura	50
(e) National Demons.Programme, Sabour	50
(f) Krishi Vigyan Kendra, Munger	100
(g) National Service Scheme, Sabour	100
(h) Irrigation Research Station, Araria	30
(i) Krishi Vigyan Kendra, Banka	50
Patna Campus :	
(a) Bihar Veterinary College, Patna	150
(b) Agril. Research Institute, Patna	150
(c) Operational Res. Project, Adhaura	50
(d) Irrigation Res. Station, Bikramganj	50
Grand Total :	2,000

Under this programme, the following demonstrations were conducted with proven potentialities, adopting matching package of practices.

(i) Crop demonstrations	236
(ii) Fruit and vegetable demonstrations	4
(iii) Animal Science and Goat Keeping	80
(iv) Poultry	150
(v) Fisheries	8

Impact on productivity :

Crops	Before the programme	After the programme
Paddy	10-18 q/ha	34-46 q/ha
Maize	18-30 q/ha	30-45 q/ha
Potato	150-200 q/ha	200-300 q/ha
Jute	12 q/ha	20-22 q/ha

RESULTS AND ACHIEVEMENTS

Results and achievements of the demonstrations conducted are given below.

Average yields of crops grown under Lab to Land Programme demonstrations.

Sl. No.	Crop	Variety	Average Yield q/ha
1	Groundnut	(M-13)	15 00
2	Paddy	(Janki)	26.00
3	Paddy	(R-201)	23.00
4	Maize	(Suwan)	25.00
5	Rai	(Varuna)	19.00
6	Gram	(G-114)	18.00
7	Maize	(Laxmi)	55.63
8	Linseed	(T-397)	16.00
9	Pea	(B.R. 12)	17 60

ACCOUNT

The Budget Estimates of the University were framed and Accounts were maintained under the following divisions :

A. Revenue Receipts

B. Expenditure
   1. Non-Plan
   2. Plan
   3. I.C.A.R. Research schemes
   4. I.D.A. programmes
   5. Miscellaneous schemes
   6. Suspense Accounts.

The financial working of the University during the year 1983-84 and the budget for the year 1984-85 (revised) and 1985-86 (estimates) are enclosed herewith in appendix 1 and 2.

Agril. Non-Plan :

This part of Expenditure and Budget which represents the committed and non-developmental items namely salaries of the employees and normal contigencies including ordinary repairs and maintenance costs of buildings, machineries, vehicles, electrical and water supply installations, if finance by Govt. grant and the University receipts taken together.

A total provision for a sum of Rs. 417.54 was made under the Revised Estimates of 84-85 and Rs. 490.55 for the Budget Estimates for 85-86.

Sixth/Seventh Five Year Plan :

The State Govt. have sanctioned a sum of Rs. 90.00 lacs in the year 1984-85 against the total outley of Rs. 326.00 lacs for the Sixth Five Year Plan (1980-85). Accordingly a budget for a sum of Rs. 90 00 lakhs was prepared for the year 1984-85 and submitted to Govt. of Bihar. In the revised budget 84-85 a provision for a sum of Rs. 93.07 lakhs was made due to enhancement of Pay. C.L.A., Bonus and other expenditures as per order of the Govt.

The Budget Estimates (85-86) under Seventh Five Year Plan, are arrived at on the basis of the discussions with the Agril. Dept. in their working group meetings in which the University was represented the Planning Officer. The total estimates for the first year of VIIth Five Year Plan comes to Rs. 3,70,55,630 only equal to about 1/5 of Rupees eighteen crores only, the total outlay of the VIIth Five Year Plan for the Rajendra Agricultural University, Bihar, Pusa.

The 7th Five Year Plan (85-90) has been submitted to the Government earliar to the department of Agriculture and department of Planning. The Agril. department had agreed to provide the above amounts for the 7th Five Year Plan (1985-90) to the Rajendra Agricultural University, Bihar, Pusa.

A special assistant of Rs. 153.96 lacs was sanctioned by the State Govt. in two instalments for construction and works and purchase of equipments, furniture etc. for the College of Basic Science and Humanities. Out of this amount Rupees 32.36 lacs was left unspent at the close of the 1983-84 financial year. Provision for a sum of Rupees 4 72 lacs is made in the Revised budget 84-85 and Rupees 21.21 lacs in budget estimate of 85.86.

A proposal for Rupees 1250 crores under 7th Five Year Plan for the year 1985-90 was sumitted to the ICAR long before for consideration. No. confirmation has been received from the ICAR, Krishi Bhawan, New Delhi. However, as per verbal discussion in the ICAR, the ICAR is considering to sanction a sum of Rupees 3 50 crores (approx.) in the coming plan period. Accordingly, a tentative provision of 80 lacs have been made in the year 1985-96 in lum-sum against the total outlay of Rupees 3.50 crores expected to be received during 1985-90 under 7th Five Year Plan.

ICAR Schemes :

Presently 55 ICAR schemes are under operation in the schemes operation in the University. It appears that sanction of most of the schemes operated during 7th Five Year Plan expired in the year 1984-85. No further extension of these schemes in the 7th Five Year Plan has been given so far. However, provision in the budget of 1985-86 against those schemes have been made on the basis of last year budget. In respect of pay and allowances the staff engaged in the scheme, provision has been made at the rate, at which the salaries are payable to them in the scale of provision in the University as per State Govt. rule in which many of the cases are higher than the pay scale provision in the scheme by the ICAR. In respect of the T A. & C.N C. provision of the same amounts have been sanctioned by the ICAR have been made while ICAR release the grant on the basis of the allocation by them for the year, the expenditure over the scheme are incurred by the operating units, on the basis of the University budget.

Due to revision of Pay Scale by the State Govt. the enhancement of C.L A and Bonus, the provision made by the ICAR against the scheme are not sufficient to meet the actual demands of the University.

Miscellaneous schemes :

This part of the budget includes the expenditure from the grant received from various authorities like Govt. of India, State Govt., Fort foundation, PL-480, Cymmit, Bio-gas etc. The provision in budget is made as per availability of fund by the agencies and the expenditure is made accordingly.

APPENDIX—1

Financial working for the year 83-84

Showing the opening belance Recipts and Expenditure during the year and balance at the end of the year

Sl. No	Head of Accounts	Opening Balance	Receipt of the grants + University receipts	Total	Expenditure	Balance	Remarks
1	2	3	4	5	6	7	8
A. Non-Plan Grants :							
1.	Agriculture-Non-Plan	(—) 64.60	240.71	176.11	322.78	(—) 164 67	
2.	R. H. Non-Plan	(—) 59.22	39.63	(—) 19 59	33.64	(—) 73.23	
B. Plan Grants :							
1.	Agriculture-Plan	(—) 18.51	74.17	55 66	57 37	(—) 1 71	
2.	Spacial Grants for Development	(+) 32.03	—	32 03	(—) 0.33	(+) 32 36	
3.	A. H. Plan	(+) 0.62	—	0 62	—	(+) 0.62	
4.	College of Dairy Science	(+) 29.47	24.00	53 47	1.93	(+) 51.54	
Total—A+B :—		(—) 80 21	378.51	298.30	435.39	(—) 137 09	
C. I.C.A.R. Grants :							
1.	Research Schemes	(—) 9.51	82.43	72.92	58 84	14.08	
2.	I.D.A. Works	(—) 15.85	5 22	(—) 10 63	(—) 0.13	(—) 10.50	
Sub-Total		(—) 25.36	87.65	62.29	58.71	3.58	
D. Miscellaneous Scheme :							
1.	Misc. grants from the State Government.	2,41	0.10	2.51	—	2.51	
2,	Misc. grants from Govt. of India & other Agencies	1.24	14.41	15.65	7.77	7.88	
Sub-Total		3.65	14.51	18.16	7.77	10.39	
E. Suspense Accounts :							
1.	Misc., I.D.A. & other Suspense	155.96	268.38	424.34	49.93	374.41	
Sub-Total		155-96	268 38	424 34	49.93	374.41	
Grand Total		54.04	749.04	803.08	551.80	251.28	

APPENDIX-2

Rajendra Agricultural University

Revised Budget 84–85 and Budget Estimates 85–86

		Rupees in Lakhs Revised Budget 1984-85	Rupees in Lakhs Budget estimate 1985-86
1.	Agril. Non Plan	417.54	490.55
2.	A. H. Non-Plan	69.76	72.67
3.	Agril. Plan including special Plan Assistance	101.39	391.77
4.	Grants expected to be received under Plan Head for Development of university by ICAR under VIIth five year Plan.	—	80.00
5.	ICAR Research schemes	109.03	107.93
6.	Misc. schemes	10.24	6.89
7.	Suspense Accounts	107.47	219.03
	Grand Total of the Budget	815.43	1368.84

STUDENTS' WELFARE :

The distribution of fellowships and scholarships of different types as well as arrangement of Educational Tours of stndents of the constituent colleges was undertaken by the Students' Welfare Cell. Besides, these all the functions, as defined in the Rajendra Agril. University Statutes such as organising extra-curricular activities, supervision and co-ordination of management of hostels, cafeteria and messes, promotiong of discipline among students etc. were performed by the Cell. Due to dearth of Staff and students, placement cell could not be established, still casually advertisements and notifications from different agencies were obtained and these were circulated among the students of all the Campuses of the University.

HOSTEL :

For main Campuses of the University conduct the teaching programmes of undergraduate and postgraduate students in different disciplines. All these Campuses have students' hostels, the break-up being as under :

Campus	Boys' hostel	Girls' hostel
R.A.U. (Hqrs), Pusa.	1	1
T.C.A., Dholi.	2	1
B.V.C., Patna.	3	1
B.A.C., Sabour.	3	–

It may be pointed out that there are no separate hostels for P.G. and U.G. students in any Campus and both the groups have to live together. At Pusa Campus there are four Colleges and different P.G. departments of the Agriculture Faculty. The V.L.Ws' are also admitted in U.G. Agriculture and they too reside in the same hostel.

Administration of hostel :

The hostel administration is run by Warden of hostels assisted by a few Hostel Superintendents who, in turn, are assisted by Prefects nominated from amongst the students. A hostel has been divided into suitable number of wings and each wing has a Prefect. The above staff members work under the overall supervision of the Principals of the respective Colleges. At Pusa Campus, the over-all-supervision of Boys' hostel was done by Professor-in-charge, College of Basic Science and Humanities while that of the Girls' hostel by the Dean, College of Home Science. However, there is a full time hostel clerk at Pusa Campus, Boys' hostei as well as and in the Girls' hostel to maintain Stores. accounts and other records of the hostels.

All hostels have been provided with requisite number of Ward servants.

Facilities provided to students in Hostel :

Residence : All the students have to reside in hostels except a few in-service P.G. Students who reside in their quarters. Besides, furnitures, lights and fans the students have been provided electricity by generators. For day-to-day works concerning electrical repairs round the clock supply of electricity, an electrician has been provided and he stays in the hostel. During the year under report the electrician was staying in the hostel.

T.V. sets had been provided in all the hostels for recreation and improvement of general knowledge of students including in the Girls' hostel at Pusa.

Common room : Each hostel has a common room with facilities for reading materials such as Newspapers, Magazines and a small library. Indoor games like carrom board, chess etc. are also played therein. A common room Secretary is nominated from amongst the students, who helps the Superintendents and Warden to ensure that all facilities are made available in the common room to the full satisfaction of students.

However, only one common room is not sufficient to accommodate library, reading room, indoor games like table tennis etc This in the Campuses separate rooms are essentially required to give these facilities. In other words, separate rooms for reading room and library, table-tennis, other indoor games and a T.V. room should be essentially provided.

In the Boys' hostel, Pusa the situation remaind as reported in the annual report of 1982-83. However, there is a proposal to provide two reading rooms one for P.G. and one for U.G. students by enclosing small open spaces with partition wall (wooden).

Mess arrangements :

Boy students continued to take their meals in Cafeteria and messes and light snacks breakfast in canteen at all the Campuses.

In the Boys' hostel, Pusa, stainless steel crockeries were provided since China clay crockeries were prove the breakage. In the Girls' hostels, a mess was run undr supevision of the Hostel Superintendent. The mess served both meals and breakfast to students.

Factivities : As usual, in all Campuses petty amount of money were granted to students in hostels on the occasions of 15th August, Deepawali, 3rd December (University Foundation-day) and 26th January for these celebrations.

Medical facilities : As Pusa Campus the Medical wing of the University used to take care of students' health, a male doctor used to visit the Boys' hostel and a lady doctor used to visit the girls' hostel at a regular intervals and

examine the health of individual students. Besides, the ailing students used to go to University hospital for medical advice. In serious case the ailing students were referred to standard Hospital such as Darbhanga Medical Hospital. No. of such cases referred to D.M.C.H. varied from 5 to to 10 per month. For transport of the ailing student to the referred hospital, a vehicle is provided by the University.

A medical attendent on casual basis was posted in the Boys' hostel to attend the ailing student and maintain the medical stock in the hospital. He resides in the hostel so that his services could be utilised all the 24 hours.

Extra-curricular activities :

Games and Sports : Sri B. B. Singh, Asstt. Professor, Agril. Economics continued to function as Officer-incharge, University Games and Sports during the year under report. Under his leadership the Inter College Games and Sports tournaments were held and University Teams were constituted. A few of these teams were sent out to participate in the Inter-University Tournament, '83-84.

Inter-Collegiate Tournament :

Inter-Collegiate Tournaments held during the year are given below with necessary details :

Name of the event	Date on which	Participants	Winners	Runners	Place where organised
1	2	3	4	5	6
Foot-Ball	17.9.'83	TCA, Dholi, BAC, Sabour BVC, Patna and CBS & H., RAU, Pusa	TCA, Dholi	BVC, Patna	Pusa
Badminton (Men)	28.11 '83	do	TCA, Dholi	BVC, Patna	Pusa
Badminton (Women)	28.11.'83	College of Home Science, Pusa TCA, Dholi BVC, Patna	BVC, Patna	Coll. of Home Sc. Pusa	Pusa
Table Tennis (men)	28.11.'83	All the four teams as in Foot-ball	TCA, Dholi	BVC, Patna	Pusa
Table Tennis (Women)	28.11.83	All the three teams as in Badminton	Coll. of Home Sc. Pusa	BVC, Patna	Pusa
Cricket.	11.1.87	All the four Colleges as in Foot-ball	TCA, Dholi	BSC, Sabour	Sabour

In the above tournaments outstanding players were selected by a panel of judges to form the University Teams in foot-ball and badmiton games. The names of players selected for these games are given below :

Foot-ball :

1. Shri Alakh Niranjan (Capt.).
2. ,, M. K Boos.
3. ,, B. K. Gupta
4. ,, D. P. Roy
5. ,, N. D. Bhutia
6. ,, H. B. K. Singh
7. ,, P. N. Bhutia
8. ,, Anjani Kumar (All from T.C.A., Dholi)
9. ,, Gulam Rasool Bag
10. ,, T. Padun
11. , N. D. Mintoo
12. ,, P. Khamba Singh
13. ,, L. Narendra Singh (All from B.V.C., Patna)
14. ,, S. N. Prasad Singh
15. ,, B. Saren (From CBS & Humanities)
16. ,, B. N. Sharma (From B.A.C. Sabour)

Badminton (Men) :

(a) Shri P. K. Sinha, T.C.A., Dholi-Captain
(b) ,, S. M. Sahay, ,, ,,
(c) ,, M. K. Boss ,, ,,
(d) ,, R. A. Mishra, B.V.C., Patna
(e) ,, A. K. Saha, ,, ,,

Badminton (Women) :

(a) Miss. Usha Rani, B.V.C., Patna-Captain
(b) ,, Jyoti Disri, ,, ,,
(c) ,, Karuna Kumari, College of Home Science, Pusa
(d) ,, Shipra Kumari, ,, ,, ,, ,,

INTER-UNIVERSITY TOURNAMENT :

The following teams were sent to participate in the Inter-University Tournament held at various places as mentioned below. Other teams could not be sent due to various unavoidable circumstances particularly due to the dates of examinations and Inter-University Tournaments coinciding with each other.

Teams	Place where organised	Date
1. Foot-ball	Raipur (M.P.)	26.12.83
2. Badminton (Men)	Bokaro Steel City, Bokaro	14.12.83
3. Badminton (Women)	do	14.12.83

Though none of the above teams could reach upto final and lost to other participating teams, their performance was fairly satisfactory in view of the fact that this was their first participation in the Inter-University Tournaments. Secondly the boys or girls are admitted in the University through competitive admission tests in which only meritorious students can compete. It is very rare that meritorious students are good players or sportsmen. Thirdly the team of 16 players is formed out of about 700-800 students only in the University whereas in Traditional University, only one College has 2000 or more students. Thus we do not expect out students to give outstanding performance in Inter-University Tournaments.

Debating Society :

The Debating Society hold debates at regular intervals and the selected best speakers from both boys and girls were send to participate in the All-India Agril. Colleges/Universities debates organised at Bihar Agril. College, Sabour on 17.8.83. The team of Rabindra Bharti University was declared the best, which the Bihar Agril. College, Sabour team was the second best.

An Inter-Collegiate debate was held at Pusa on 8.9.83.

Our team also participated in Inter-University debating competition organised on 8.4.83 by Sahebganj College, Sahebganj and our team was the second best here also.

Literary Society :

This society organised Kavi Goshthi in which a large number of students presented their poems many of which very much appreciated by the audience.

Under the auspices of this society "Kaumi Ekta Divas" was organised on the 2nd December, 1983. The student participated spoke on the subject 'Anekta me Ekta'. The top three speakers were selected for award of prizes.

Music and Drama Society :

The Music and Drama Society organised cultural programmes on two different dates. During the year viz.; 4.10.83 and 3.12.83. In spite of the shall number of instruments available, the student participants, both boys and girls, could keep the audience in good humour and thrills.

Film Society :

Like the Games and Sports Society, the film society was also very active throughout the year. In organised 17 (Seventeen) film shows in the Vidyapati Kala Kendra (Flax House) of the University at intervals of about a fortnight on an average. The President of the Society, Dr. K. L. Ojha deserves congratulations for the activities of Film Society.

Fine arts and photographic Society :

This society did not make much headway during the year due to extreme handicaps in running the functions of the society. However, the training of the boys art of photography was continued under the guidance of its President, Dr. Y. Prasad, Assoc. Professor, Plant Pathology, Pusa.

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