

Faculty of Agriculture

Allahabad School of Agriculture



Prof. Suresh B.G.

School Research Co-ordinator

- The School of Agriculture is one of the foremost Agricultural Institutes in the country as well as in South East Asia.
- In 1910 the Agricultural School was established to educate the farmers and introduce improved agricultural practices. Informal classes began in the fall of 1912.
- In 1932 the School offered Undergraduate programme, *i.e.*, B.Sc. Agriculture of two years' duration
- This undergraduate programme was upgraded to three years in 1966 and presently upgraded to four years as per ICAR norms.
- The School of Agriculture has had the privilege of being led by founder members of this Institute which include Prof. W. B. Hayes, Dr. A. T. Mosher, Rev. B. M. Pugh, who have been eminent scientists and visionaries involved in laying the foundation of this institution and have represented the country internationally.
- To develop strategies for sustainable agriculture and maximizing production.

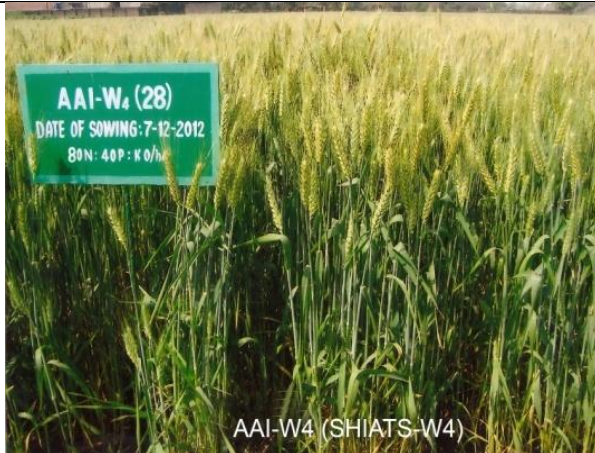
Crop Breeding for food security at SHIATS, Allahabad

The university scientists have successfully carried out genetic improvement work of major field crops, which has contributed to the food security programme of the state and country. The glimpses of breeding efforts are summarized here as under:

Wheat varieties developed at SHIATS:

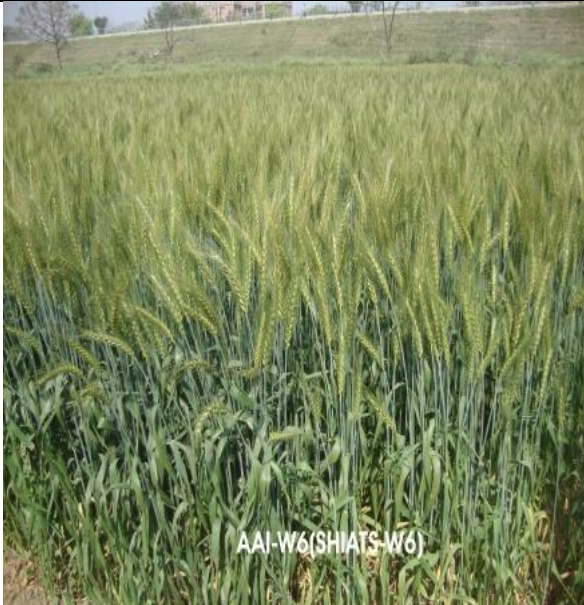
Name of the Breeder - **Prof. (Dr.) Mahabal Ram**

SHIATS-W4



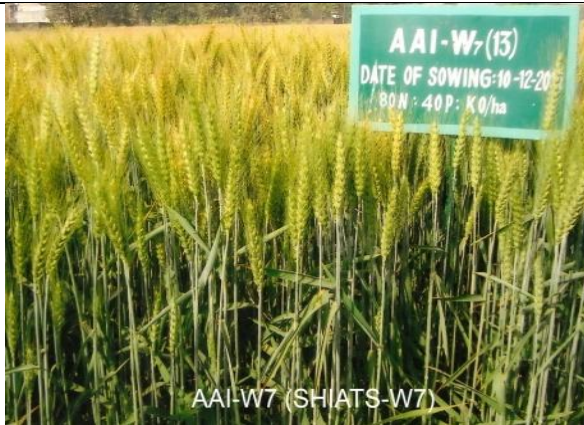
Semi dwarf, matures in 120–125 days, high temperature tolerant (33-35⁰C), disease- resistant to brown rust, smut, leaf-sheath blight, moderate fertility (80N: 40P: 30K kg/ha) responsive, good for limited irrigation (3–4), its grain colour is amber, bold and makes soft and excellent chapatti, protein- 12.5% & sugar- 0.59% , It has yield potential of **45-50 q/ha.**

SHIATS-W6



Semi dwarf, matures in 115–120 days, high temperature tolerant (35-40⁰C), tolerant to water logging (7–10 days), resistant to- brown rust, leaf-sheath blight and smut. Low to moderate fertility (60 – 80N: 40P: 30 kg/ha) responsive, good for limited (2–3) irrigations, it is dual purpose variety (grain yield plus good bhusa yield), Its grains are bold and amber in colour with rotein- 13% protein and sugar- 0.57%. Its yield potential- under timely sown conditions (**45-50 q/ha**) and under late sown conditions (**36-40 q/ha**).

SHIATS-W7



Dwarf, lodging resistant, matures in 105–110 days, high temperature tolerant (35-40⁰C) of march/april. Resistant to brown rust, smut, leaf-sheath blight. Low to moderate fertility (60-80N: 40P: 30K kg/ha) responsive, good for limited irrigations (2–3). Its grains are amber, bold and makes soft and sweet chapatti with protein content (11.6%) and sugar content(2.40%), Its yield potential is **36-40 q/ha** (in late sown conditions).

SHIATS-W8



Semi dwarf wheat variety, which matures in 115–120 days. It is high temperature tolerant (35 - 40°C) and resistant to brown rust, smut, leaf-sheath blight diseases. Low to moderate input responsive (60-80N: 40P: 30K kg/ha), which requires limited Irrigations (2–3), Dual Purpose- (Good in grain & bhusa both). Its grains are amber, bold and makes soft and sweet chapatti, with protein content(11.3%) and sugar (2.5%). Its yield potential- under timely sown conditions (**45-50 q/ha**) and under late sown conditions (**38-40 q/ha**).

SHIATS-W9




Dwarf, lodging resistant, matures in 105–110 days, high temperature tolerant (35–40°C) of march/april. Resistant to brown rust, smut, leaf-sheath blight. Low to moderate fertility (60-80N: 40P: 30K kg/ha) responsive, good for limited irrigations (2–3). Its grains are amber, bold and makes soft and sweet chapatti with protein content (11.6%) and sugar content(2.40%), Its yield potential is **36-40 q/ha** (in late sown conditions).

Multi-Floret Wheat



New wheat genotype developed for the first time with multi-floret, developed through Mutation breeding. It is semi dwarf, lodging resistance, matures in 115–120 days. Tolerant to higher terminal temperature (35–40°C) of March/April and resistant to brown rust, smut and leaf-sheath blight, with spike length (20 – 22 cm), amber grain colour

Rice varieties developed at SHIATS:
Name of the Breeder - Prof. Suresh B.G.

SHIATS DHAN-1 (Notification no. GoI/MAGHA 5, 1935 dated January 25, 2014)	
	<p>Maturity-128 days (seed to seed). Mid early duration suited to rice-wheat cropping system. Fine grain quality, medium slender grain, moderate gel consistency and alkali spread value. Its protein content is 9.6 % (Std. value 7.1 % USDA Nutrient database) and iron content-(mg/100g) - 2.0 (Std. value 0.8 mg USDA Nutrient database), Zinc content- (mg/100g) – 1.5 (Std. value 1.09 mg USDA Nutrient database). It is also resistant to neck blast, moderately resistant to bacterial leaf blight, brown spot and sheath blight. Its yield potential is 4.4-6.5 t/ha, (under irrigated condition)</p>

SHIATS DHAN-2
(AAIR 203)



Maturity- 130-132 days (Seed to Seed).

Yield potential- **5.0-5.5 t/ha** five grain
(long slender grains, suited for rice-
wheat cropping system)

SHIATS DHAN – 3
(AAIR 205 Rice)



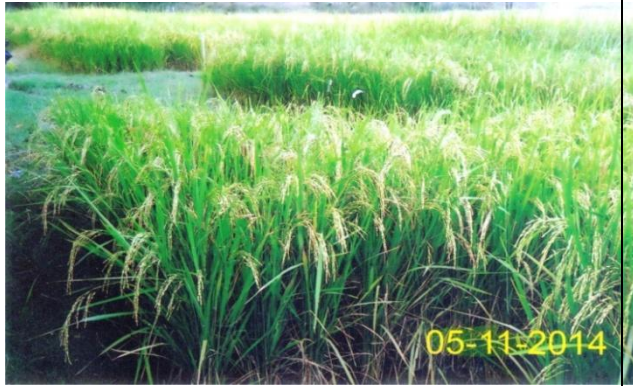
Late sown wheat cropping system, yield potential **6.0-6.5 t/ha**, Fine grains long slender, good for cooking & eating quality

SHIATS DHAN – 4



It is medium- duration rice variety suited to rice-wheat (timely sown) cropping system. Its yield potential is **5.5-5.8 t/ha**, medium slender fine grains, 130-135 days maturity, HRR 65% and moderately resistant to brown plant hopper and bacterial leaf blight.

SHIATS DHAN – 5



It is early duration rice variety suited to rice-wheat (timely sown) cropping system. Its yield potential is **3.8-4.0t/ha**, long slender fine grains, matures in 120-125 days, HRR 63.50%, and moderately resistant to brown plant hopper and bacterial leaf blight.

Agronomy Research

Model Organic Farm (2 hectares/5 acres area) at SHIATS was developed, which had a provision for Certification. All the 3 years the Certification was done by Lacon Quality Certification (P) Ltd. [Accreditation No. NPOP/NAB/006, Ministry of Commerce, Govt. of India] and the same is being continued for the 5th year consecutively (current validity is till May 2014). **Certificate No. ORG/SC/1009/001070** (Plate 1).



Plate 3



Plate 4

The Model Organic Farm (SMOF) demonstrates an integration of over 75 species under multiple cropping systems (Plate 2) with immense diversity, proving that the sustainable livelihoods of marginal (below 1 ha) and small farmers (1 to 2 ha) is feasible to cater to most of the necessities of a homestead, including sufficient fodder (for the piggery/poultry unit), fuel as well as certain high value crops like mushroom and exotic vegetables, apart from the scope of generating some additional revenue through an integrated farming system. It is a model depicting both food and nutrition security.

Research on organic certification standards of rice grown in SRI Technology (Plates 3 & 4) revealed satisfactory and promising findings with the mean productivity of 8.23 t ha⁻¹ in 2009 and over 14.0 t ha⁻¹ in 2010. For the system to be competitive in facing the various biotic and abiotic constraints, the package of practices requires a number of intercultural operations, viz., cono-weeding at least 2 times (20 and 40 DAT) (Plate 3),

Plate 5



Plate 6

application of
organic
sources of

nutrients as top dressing, viz., *Bokashi*, Fish Amino Acid, *Panchagavya* etc. Preventive and control measures for plant protection, particularly against shoot borer, viz., neem fruit pulp extract along with irrigation, Pheromone trap, spray of 1% wood vinegar + neem oil, etc are necessary. Green manure crop of *Crotolariajuncea* in *zaid* prior to the rice crop is a vital practice.



Plate 7



Plate 8

Schedule of Events under NPOF [Training Programmes and Field Demonstration]				
S. No	Name of Training Programme / Demonstration	Training Programme No.	Date of Events	Number of participants
1.	Training Programme for Production and Quality Control of organic inputs	PQCOI-1	February 18 to 27, 2009	20
		PQCOI-2	March 17 to 26, 2009	19
2.	Training Programme for Field Functionaries/Extension Officers on organic farming	FFOF-1	January 27 to 31, 2009	17
		FFOF-2	June 30 to July 04, 2009 [rescheduled from Feb 10 to 14, 2009]	18
		FFOF-3	March 3 to 7, 2009	18
		FFOF-4	April 14 to 18, 2009	16
		FFOF-5	May 5 to 9, 2009	16
3.	Training Programme for Farmers on organic farming	FOF-1	November 21 to 22, 2008	20
		FOF-2	December 12 to 13, 2008	20
		FOF-3	January 23 to 24, 2009	08
		FOF-4	February 6 to 7, 2009	19
		FOF-5	March 13 to 14, 2009	18
		FOF-6	June 26 to 27, 2009	20
		FOF-7	[rescheduled from April 10 to 11, 2009]	07
		FOF-8	May 15 to 16, 2009	19
		FOF-9	May 23 to 25, 2009	18
		FOF-10	June 5 to 6, 2009	18
4.	Field Demonstration	FD-1	February 28, 2009	52
		FD-2	March 9, 2009	51
		FD-3	November 6, 2010	46
		FD-4	November 10, 2010	50
		FD-5	November 13, 2010	51

Similarly, organic Sesame registered a productivity of 8.77 q ha^{-1} . In the *Rabi* seasons Lentil and Wheat trials were taken up with acceptable outcomes. The study on Wheat under 2 systems, viz., furrow irrigated raised bed planting (FIRB) (Plate 5) & conventional systems showed a potential productivity range of 4.5 to 6.0 t ha^{-1} . Besides, data of two other activities under NPOF viz., Training Programmes and Field Demonstration are depicted in the Table and portrayed in Plates 6 to 8.



Plate 1



Plate 2

Implementation of OFAR models with SHF collectives is being continuously monitored and the data collection and analyses, documentation and publication is under the progress; planning and screening for refinement of Models [Design and testing of FPDCS Models and On-Farm Action Research (OFAR)] is being undertaken on the basis of eco-systems [Sub-Humid Tropical Hilly/Plateau AES under AEZ 5 & 6 of FAO] and seasons in the 3 districts, viz., Sagar, Satna and Mandla.

National level as well as South Asia Coordination Unit (SACU) level Review-cum-Action Plan Workshops of the SAFBIN Programme is conducted on regular basis with the objective to screen the appropriate FPDCS.



Plate 3 Interactive field visit at Pokhara, Nepal in Dec'12

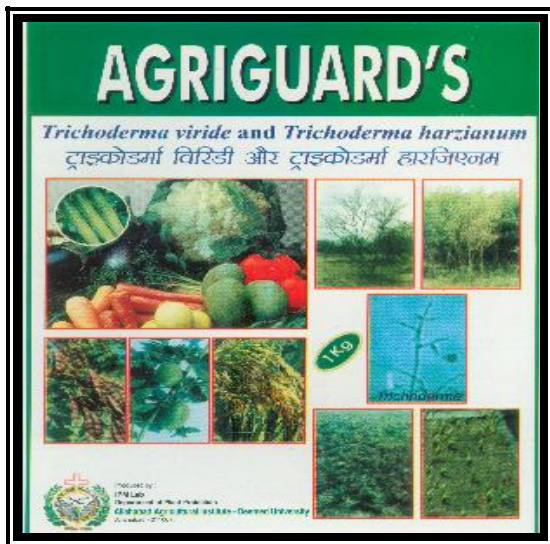
Emerging Results:

Increased understanding and use of documented innovations in rainfed SHF-FPDCS towards adaptive food security and climate change mitigation;

Improved productivity, diversification, and adaptation in small farms in vulnerable and remote rainfed AES in the context of climate change;

SHF-FPDCS models are being developed by and for SHF (Plate 3); managed and refined by SHF, with facilitation of other stakeholders on OFAR platform with the involvement of researchers, decision makers and extension agents in the multi-stakeholders monitoring process to ensure constant value addition and up gradation.

Mass Production and Distribution of Tricoderma to Farmers



The Department isolates the fungal antagonists of *Trichoderma harzianum*, *T. viride*, *T. hamatum*, *T. virens* and 20,000 kg of *Tricoderma* spp. was produced by the Department of Plant Pathology under the program of **Bio-pesticide production project sponsored by UPCAR** and it was distributed to nearly 12 districts of Uttar Pradesh through Plant Protection officers of state Govt. in their demonstration & validation plans. Through this project many farming community

have been benefited. *Trichoderma* spp. Is being used for the control of soil born diseases of vegetable, field crops and guava wilt during the demonstration trial.

National Referral Lab

National Referral Lab sanctioned by the Department of Biotechnology, Government of India to provide a testing service for monitoring the quality of bio-pesticides and bio-agents being used in the state of Uttar Pradesh. Since its inception, samples are being received for analysis from various District Horticulture Officers under NHM program. The Lab certifies bio pesticides / bio fertilizers (micro organisms) produced by the various Private Ltd. companies for its viability for distribution to the farmers through state government organizations.

Other Achievements:

- Paired row rabi maize when intercropped with legumes like pea, chickpea and lentil increases the profits and reduces the investments on weed management.
- Paired row sunflower intercropping with rajmash not only increases the profits from sunflower cropping but also reduces the expenses on weed management.
- Alley cropping system with a few species in the organic model farm viz., *Leucaena leucocephala*, *Phyllanthus emblica* and *Citrus* sp. Intercropped with several crops during any season of the year showed six fold benefits of soil protection, water conservation, enhanced soil fertility, reduced weed menace, diversified production, particularly fuel and fodder and larger biomass productivity.
- Direction of sowing: Among the non-monetary inputs north - south direction of sowing showed better response with reference to growth and yield of *rabi* crops in particular.
- Integrated nitrogen management: Intercropping cereals with pulses not only helps in reducing the nitrogen fertilizer application to cereals by 1/4th, but also diversifies the production and reduces the expenses on weed management.
- Weed management: In an experiment on wheat, application of tank mixture of Fenoxaprop – p- ethyl + adjuvant at 1.5 kg/ha resulted in minimum crop weed competition, maximum benefit cost ratio, with yield comparable to weed free plot.
- Planting techniques: Square planting of 12 days old, one seedling/hill of hybrid rice under SRI technique out yielded transplanted rice by one and a half times.

- Seed soaking treatment with 5% potassium hydrogen phosphate solution and foliar spray of planofix along with the RDF of NPK resulted in higher grain yield under irrigated condition.
- Maintenance of guava variety Allahabad Surkha by Dept. of Horticulture, SHIATS
- Guava wilt, worldwide problem can be managed either intercropping of marigold, garlic and turmeric or the application of Neem cake @ 5 kg per tree or the application of ammonium sulphate @ 360 g single super phosphate @ 180 g and murate of potash @ 180 g per tree.
- Women farmers are trained / encouraged in production of rich organic compost through vermin composting, NADEP method in Hathigalan and Malak Hashee in Soraon block.
- In field and on farm trainings 35 nos. benefiting nearly 2240 farmers (including women farmers), VCFs, extension workers/ kisan mitras and two nos. of 10 days training to farmers on Bio-pesticide production & use.
- IPM modules have been developed and validated for tomato, chickpea, pea, paddy, potato and guava.

Awards and Honors

- ❖ ICAR Best Research Scientist Award 2014 conferred to Prof. Suresh B. G., Professor, Department of Genetics & Plant Breeding for developing high yielding, moderately resistant rice varieties (Good for cooking quality).

School of Forestry and Environment:



Dr. B. Mehera

School Research Co-ordinator

Realizing the importance of forestry education, Allahabad Agricultural Institute-Deemed University established Department of Agroforestry in 2001 and started undergraduate and postgraduate forestry courses. The Dept of Agroforestry was upgraded to College of Forestry on October, 2001 with a prime objective of promotion of **education, research and extension in the field of forestry, Agroforestry, soil and environmental science**. Later on College of Forestry was renamed as College of Forestry and Environment and now as “School of Forestry and Environment”.

The mission of School of Forestry is to develop professionals for the corporate sector as well as for other socio-economic institutions for welfare of people. It focuses to develop simple, low cost and farmer’s friendly technologies through its Research Development and Technological Innovation programmes for the benefit of farmers and to foster the progress of the nation.

Flute Technology: Scientist involved: Prof. S. B. Lal

The technology developed and standardized for artificial regeneration of hollow bamboo is “**Flute Technology**”. Fast growing tendency was observed in the bamboo on propagation through Flute Technology commonly known as culm cutting or stem cutting technique. It produces prolific rooting which is necessary for survival in wastelands and ready for harvest after 36 months. The Technology is simple and cost effective. The culm is not affected by pests and diseases. The Cost of cultivation is very low and the method of preparation is very simple. National Mission on Bamboo Application of DST has approved this technique and provided a technology recognition certificate.



Fig.1. Preparation of plots for propagation of bamboo from culm through flute technology in the forest nursery and research center



Fig.2. Initial stage of bamboo development from culms through flute technology in the forest nursery and research center



Fig.3. Demonstration on growth of rhizome in to bamboo plants through flute technology



Fig.4. Prof (Dr.) S.B. Lal Dean and Pro vice chancellor (Administration) SHIATS examining bamboo culm for propagation through flute technology in the forest nursery and research center

Agroforestry Models:

The agroforestry models were developed to reclaim the wastelands and increase the productivity of land. The successful models were established by the school of forestry & environment, SHIATS for wasteland reclamation, increasing forest cover in Uttar Pradesh. These models are as follows:

Agri-Silviculture models:

Subabul (*Leucaena leucocephala*) + Black gram (*Vigna mungo*),
Bamboo (*Dendrocalamus strictus*) + Mustard (*Brassica* spp.)

Agri-Horticulture models :

Aonla (*Emblica officinalis*) + Mustard (*Brassica* spp.),
Mango (*Mangifera indica*) + Pigeon pea (Arhar),

Silvi-Horticulture models :

Subabul (*Leucaena leucocephala*) + Mango (*Mangifera indica*),
Arjun (*Terminalia arjuna*) + Aonla (*Emblica officinalis*)

Agri-Silvi-Horticulture models :

Pigeon pea + Bamboo (*Dendrocalamus strictus*) + Aonla (*Emblica officinalis*)

Major Bamboo Based Agroforestry Models:

The major farmers-friendly bamboo based agroforestry systems developed under the project which showed better performance and compatibility in Uttar Pradesh are,

1. Wheat + Bamboo (*Dendrocalamus strictus*) (Agri-Silviculture)
2. Bamboo (*Bambusa balcooa*) + Aonla (*Emblica officinalis*) (Silvi-Horticulture)
3. Pigeon Pea + Bamboo (*Dendrocalamus strictus*) + Aonla (*Emblica officinalis*) (Agri-Silvi-Horticulture)
4. Mustard (*Brassica* spp.) + Bamboo + Mango (Agri-Silvi-Horticulture)



Fig.5. A view of rice field under citrus based agroforestry system in forest nursery



Fig.6. A view of bamboo based agroforestry system in forest nursery



Fig.7. A view of line plantation of poplar based agroforestry system in forest nursery



Fig.8. A view of wheat cultivation under citrus based agroforestry system in forest nursery

IC numbers of *Jatropha curcus*:

The genotype and phenotype variability of seed and seedlings in *Jatropha* under Allahabad condition showed that the provenance of TFRI-II performed best followed by IGAU-Raipur for

seed and seedling growth character. In addition, methods of macro propagation were standardized for propagation of *Jatropha curcas* through cuttings and large scale production of quality *Jatropha curcas* seedlings were carried out. Comparative study of *Jatropha curcas* seeds from different states viz. Maharashtra, Gujarat, M.P and Rajasthan for the screening of high yielding varieties and to study the productivity patterns of *Jatropha curcas* in different agroforestry models are being carried out.

Following seven IC numbers have been allotted

1. AAIL1 574003
2. AAIL2 574004
3. AAIL3 574005
4. AAIL4 574006
5. AAIL5 574007
6. AAIL6 574007
7. AAIL7 574007



Fig.9. *Jatropha* fruit



Fig.10. *Jatropha* seed inside the Fruit



Fig.11. Panoramic view of *Jatropha* nursery at Forest Nursery & Research Centre, AAI-DU



Fig.12. *Jatropha curcas* branch of two years hedge row plantation at full bloom



Fig.13. Fruits of physic-nut (*Jatropha curcas*) at maturity



Fig.14. *Jatropha curcas* Sampling in poly bags in green house

The mission of school of forestry is to developed professional for the co-orporate sectors as well as for other socio-economic institutions for welfare of people. It focuses to developed simple,low

cost and farmers friendly technologies through its R &D and technological innovations programs to foster the progress of the nation.

School of Forestry & Environment, SHIATS, Allahabad has developed and standardized a technique for artificial regeneration of hollow bamboo which is famously called “*Flute Technology*”. Fast growing tendency was observed in the bamboo on propagation through flute technology commonly known as culm cutting or stem cutting technique. It produces prolific rooting which is necessary for survival in wastelands and ready for harvest after 36 months. The technology is simple and cost effective and the culm is not affected by pests and diseases. National Mission on Bamboo Application (NMBA) of DST has approved this technique and provided a technology recognition certificate.

The major farmers friendly bamboo based agro-forestry systems developed by this school includes: Wheat + Bamboo, Bamboo + Anola, Pigeon pea + Bamboo + Anola and Mustard + Bamboo + Mango

Ethelind School of Home Science



Prof. Ranu Prasad
School Research Co-ordinator

The Ethelind School of Home Science (earlier the Dept. of Home Economics) is about 78 years old and one of the oldest in imparting Home Science education in the country. It works towards the objective of imparting Home Science education to promote cognitive and effective learning among student for technology transfer to both urban and rural families within the culturally relevant conditions an eco-based farm house hold system to strengthen teaching-research-extension linkages.

Experiential Learning Projects

(1) Food Processing and Product Development **CEO: Prof. Dr. Sarita Sheikh**
Managers : Dr. Alka Gupta and Dr. Ritu Prakash Dubey

Objectives:

- To guarantee learning opportunity to the graduate students throughout integration of basic knowledge and conceptual aspects with hands on training and practice in a real life work environment
- To instil greater confidence, competitiveness and competence among the students to meet needs of private sector and public sectors.
- To encourage the rural people to adopt food processing ,preservation and product development as source of additional income and also motivate them by giving assured market and prompt payment for their produce.
- To impart skills to students for large scale commercial preparation of the products
- To serve and build up the rural healthy community by providing nutritious processed and preserve food products as minimum possible price.
- To conduct research programme and develop suitable technologies for food processing and preservation industry.
- To help students in entrepreneurship development and also as job providers

Market Survey and Procurement of raw materials: - Preliminary market survey was done around university with local gross shopper with consumers. Based on the needs of shoppers and consumers, the products prepared were Turmeric powder, Roasted Cumin powder, Coriander powder, Red Chilly powder, Red Chilly powder, Black salt, Methi whole Panchphoran, Sabji masala, Rayi, Badi, Whole cumin seed, Whole saun Saunf, Black pepper whole, Black pepper powder, Ajwien, Dalchini powder, Potato chips, Banana chips (plain & masala) and Namkeen mathri.

(2) Designing and development of information materials CEO: **Prof. Dr. Sarita Sheikh**
Manager: **Mrs. Sangamitra Mohapatra**

Progress of the Project

- ❖ Development of portfolio for production on order for preparation of digital albums, stickers and visiting cards.

In this session, five students of Elective Information Technology and Communication Management were enrolled for Experiential Learning. They had taken up projects like PowerPoint Presentations, Pass port size photographs Personalized Key Rings(PKR),Coffee mugs, Calendars. Till date the students had completed and delivered fifteen PowerPoint Presentations, 13 sets of Passport size photographs, thirty Personalized Key Rings (PKR), four Personalized Coffee mugs, two printed Calendars. Another thirteen Personalized Key Rings and one PowerPoint Presentation are to be prepared.

Final statements will be provided on the completion of the Experiential Learning Projects. The summary sheet of expenditure and profit has been given below

(3) Apparel Production Unit CEO: **Prof. Sarita Sheikh**
Managers: **Ms Ekta Grover and Ms. Nargis Fatima**

In this session, five students of Elective Clothing and Textiles were enrolled for Experiential Learning. Apparel Production Unit has been established and is functional. Students have taken the project on preparation of Apparels including kid's frocks, kurties, tops and sarees and home furnishing articles including bed sheets and cushions. An Exhibition cum sale was put up by the students and most of the products were sold out. All the prepared articles were appreciated.

Patent Developed:
Novel Plant dye (Patent Number: 249691)

Nutri- Farm Scheme

Training program of the 'NUTRIFARM' scheme under the government of India through the government of Uttar Pradesh was conducted between 17.2.2014 TO 4.3.2014 in the Department of Foods and Nutrition, Ethelind School of Home Science, SHIATS, Allahabad. Under this scheme farmer of three districts namely Kaushambi, Allahabad & Fatehpur were covered. Altogether 11 on campus training programs were organized for trainees – group leaders. 424 number of trainees have been exposed to recipe preparation on four crops namely bajra, millet, wheat and rice. Recipes were demonstrated during training program were *Bajra laddoo, Bajra chilla, Bajra khichadi, Maize paratha, Maize pasta, Maize chilla, Maize laddoo, Maize noodles, Wheat paustik roti, Wheat chilla, Wheat laddoo, Rice laddoo, Rice paratha.*



Training conducted under the Nutri-Farm Scheme

Centre of Excellence

Under the prestigious Nutri-farm scheme a pilot project of the Govt. of India, administered through the Uttar Pradesh Govt, a Centre of Excellence for Maize was sanctioned to the Ethelind School of Home Science in October 2013 with the following objectives. It is successfully functional and regular trainings are being conducted.

Objectives

- To create awareness among people about effect of malnutrition and benefits of maize for eradicating it.
- To encourage production of maize specially HPQM varieties.
- To develop Nutri-Rich recipes that are area specific and children friendly and to popularize maize and maize produce through institute and government mechanisms.
- To attract entrepreneurs for small-scale industries and to impart training entrepreneurs for maize based recipe and its marketing.

Recipes developed:

Cake, Nankhatai, Bread, Pakoda, Makke ke dhokla, Swastwardhak chakli

Paustik paratha, Swastwardhak lacha, Paustik mattri, Paustik chille, Makke ki panjiri

Swastwardhak sevai, Makke ke ladoo, Sugar cookies, Kathiyawadi wada

Makke ke sev, Makke ke biscuit



Official inauguration of Centre of Excellence by Hon'ble Chancellor, SHIATS in the Presence of Hon'ble Vice Chancellor

PHOTOS

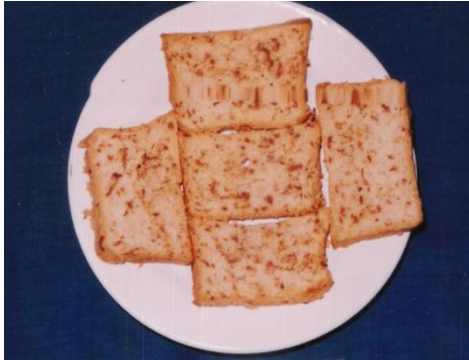


1. Achievements

Foods & Nutrition

- Under the ICAR funded adhoc project entitled “Value added products from dehydrated vegetables to combat nutritional deficiencies in rural masses” dehydration techniques for selected vegetables (spinach, *bathua* leaves, Chaulaie, onion stalk, soy leaves, Methi and carrot) have been standardized. Food products were formulated by incorporating dehydrated vegetables into 36 traditional recipes. The developed products were rich in

iron and carotene. Significant improvements in the hemoglobin levels and weight of the preschool children and adolescent girls after supplementation with the products (*bathua sev* and onion stalk *chakli*) was observed.



Recipes developed by incorporating dehydrated vegetables

- A booklet of recipes and four Video CDs developed under the project on nutritional importance of dehydrated and fresh vegetables improved knowledge scores of adolescent girls and women. Training imparted to rural women had a significant impact on their knowledge and skills.



Training given to rural women on dehydration of vegetables and product development

- Nutrition education and counseling of cancer patients (breast and cervix cancer) was conducted on 200 respondents between the ages of 30-60 years revealed that hemoglobin levels as well as red blood cells and white blood cells of breast and cervix cancer patient improved significantly after counseling ($p \leq .05$).
- Study on impact of nutritional counseling and coping strategies in women professionals revealed a significant improvement in the nutrient intake and nutritional status of the women professionals after counseling.

- *Assam, China* and *Combot* tea was assessed for antioxidant property by developing 'Tea flavoured milk'. 'Black tea flavoured milk' prepared by incorporating 20 percent tea extract and 'Green tea flavoured milk' by incorporating 10 percent extract were most acceptable.
- Nutritious products developed by incorporating soy flour and barley flour in sweet potato flour in the ratio of 50:20:30 in laddoo, 60:15:25 in panjeeri, 50:20:30 in porridge and 40:30:30 in *halwa* were found to be rich in protein, fat and iron.
- Several North Indian recipes (*laccha, chilla, chakali, mathari, poshtic paratha, dal, gatta, kachauri, laddoo*) developed by incorporating leaves of drumstick, cauliflower and beetroot were found to be rich in iron, calcium and carotene.
- *Paneer* made with buttermilk blended with buffalo milk in the ratio of 1:2 was found to be very good in terms of body, texture and overall acceptability.
- Flavored milk, *khoa* and *shrikhand* prepared from filled milk containing 3 percent vegetable oil were found comparable to the products prepared from whole milk.
- Daily supplementation of diet with niger seed laddoo for a period of 30 days in adolescent girls made significant improvement in the haemoglobin levels ($p \leq .05$).
- Nutrition education and communication materials were developed and used for enhancing the knowledge on nutrition, health and sanitation of adolescent girls living in urban slums, the impact was found to be significant.
- Products of nutritious and therapeutic benefits like whey based soup, mango and mint *lassi*, orange flavoured whey beverage, carrot ice lolly, preparation of sweets with *ghee* residue were developed by utilizing dairy by-products.
- Utilization of locally grown under-utilized plants buckwheat (*Fagopyrum esculentum*) , *lahsua* (*Digera arvensis*), *surwari* (*Celosia argentea*), *sawa* (*Echinochloa frumentaceae*), *pakar* (*Ficus infectoria*) and *Pathar chattah* (*Boerhavia diffusa*) for preparation of functional foods rich in iron, calcium, β carotene, fiber and vitamin C and supplementation with nutritious *mathri* in the diet of anemic adolescent girls showed a significant improvement in the hemoglobin status of the subjects
- Preparation of low calorie desserts, *lauki kheer*, sweet curd and custard, using stevia, a natural sweetener. The products were well accepted with regard to sensory characteristics.

Clothing & Textiles

- Dyeing & printing recipes were optimized for silk fabric with natural dye extracted from croton (*Codium variegatum*) leaves. Acid media (HCl) with 1% concentration showed good colour. Dye concentration at 12%, six minutes extraction time and 60 minutes dyeing time were optimized on the basis of percent absorption. For printing gum acacia with 8ml dye concentration showed best results with excellent colour fastness properties towards light, washing, crocking and perspiration.



Silk top prepared by standardized dyeing and printing recipe



Cushion cover dyed and printed by standardized printing and dyeing recipe

- Ready to wear blouses designed for lactating mothers revealed that the developed designs were highly acceptable.
- Bio-polishing and softening treatments were given to Jute cotton blended fabrics and hemp cotton blended fabrics respectively. Bio-polishing and softening treatments helped in improving the physical properties of fabrics including crease recovery, texture, draping quality, dyeability and absorbency. Optimized concentration for bio-polishing was 15% concentration of cellulase enzyme and for softening treatments, it was 15% concentration of silicon and 10% concentration of vinegar.
- The recipes for printing of silk and cotton with natural Red Cabbage dye were optimized. Gum tragacanth and guar gum showed best results with 8ml dye concentrate using Alum mordant in 10% concentration and copper sulphate and ferrous sulphate both in 2% concentration each.
- Banana blended fabric was dyed with synthetic dye including acid, basic, reactive, direct and vat and natural dyes including marigold flowers and *henna* leaves. Various colours ranging from light yellow to dark yellow with marigold and colours ranging from brown

to red were obtained by henna leaves. Basic dyes showed best results among various synthetic dyes.

- Adolescent girls dresses were designed and prepared inspired from *La Belle Époque* era. These included skirts, suits and evening dresses. The prepared dresses were exclusive and highly appreciated by entrepreneurs and consumers
- Stump work and hand painting techniques were combined to create exclusive apparel articles including shirts, tops and Capri, home furnishing articles including dining table cover and sofa backs as well as accessories including jewellery boxes and hand bags.

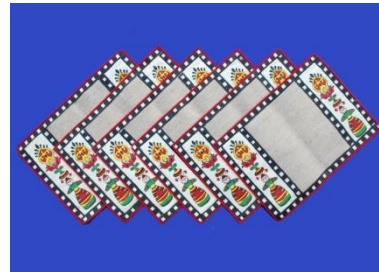
Human Development

- 30% prevalence of behavior problems and learning disabilities among children and the important causes of these problems were identified as parental carelessness, children's nature, grand parent pampering.
- Professionals working in private sectors were significantly better in their emotional intelligence than the professionals of public sectors. Significant gender difference revealed that males had better EQ than females.
- Intervention in the form of yoga and meditation was significantly useful in bringing changes in social maturity of mentally challenged children.
- Significant improvements in personality, social maturity and emotional maturity of orphanage adolescents were noticed after an intervention with introduction of physical activities and counseling.
- Studies on impact of preschool education on cognitive development and social maturity indicated that children receiving preschool education have significantly higher IQ and social maturity than the children who do not receive preschool education.
- Higher achiever adolescents had higher levels of stress and after intervention of 3 months the levels of stress improved significant.
- Socio economic status and type of child abuse had a significant effect whereas gender had a non significant impact on the prevalence of child abuse.
- Positive parenting styles were practiced by parents from higher socio-economic groups. As the socio economic status lowers the parenting styles tend to tip towards negative. Significant impact of parenting styles was seen on psychological, emotional, social and vocational guidance of adolescents.

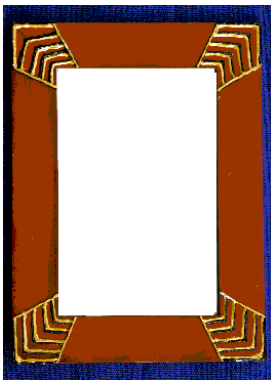


Family Resource management

- Existing wheel chair designs used by the subjects have certain design flaws in view of users comfort and efficiency and the developed prototype can be used as a guideline for the wheelchair manufacturers.
- Highly acceptable products for interior enrichment - tablemats, coasters, photo-frame, lampshades and tray, were developed using *Madhubani* style, the traditional folk art of Bihar.



Coasters and Table Mats



Photoframe



Tray



Lampshade

- A duplex box prototype solar cooker was developed which could harness higher energy than the parabolic solar cooker and box type cooker and provide larger cooking volume.



Technology developed – New products/ process/methods/techniques

Dehydration technique of six vegetables has been standardized using tray drier.

Process has been developed for dyeing and printing of silk fabrics with natural dye source extracted from Croton (*Codium variegatum*) leaves.

New ready-to-wear blouses were designed and constructed for lactating mothers.

One booklet in Hindi entitled “*Sookhi sabjiyon ke mulayvardhak vyanjan*”.

Sauce, puree, chutney and toffee from Papaya; - *Thekua*, biscuits, *puri* and bread from sweet potato; Biscuits, *laddoo* and *panjerii* from soybeans have been developed. Two tea based products viz. Green tea flavoured milk and black tea flavoured milk have also been developed.

Printing recipes were developed for *khadi* fabric using natural thickeners (Gum Tragacanth and Gum Guar)

Concentration of enzymes for bio-polishing and of softening agents for softening treatments were optimized for jute-cotton blended and hemp- cotton blended fabrics for quality improvement.

Recipes for printing of silk and cotton fabrics using natural Red Cabbage dye were optimized.

New and exclusive garments based on designs inspired from “La belle époque era” were designed and constructed for adolescent girls. Papaya based preserved foods like candy, sauce, butter, jam, and ketchup, nectars of apple and guava and kinnow marmalade were developed .

Lotus stem incorporated *paratha*, *pharra*, *chakli*, and cutlets; Bajra flour incorporated *laddo*, *paratha*, *thekua*, *khichri*; Fig incorporated *paratha*, *chilla* and cutlets; Cassava flour incorporated noodles, *nankhatai*, *mathri* were also developed .

Value added dairy products- flavoured carrot milk, *kulfi* with wheat flour incorporation, low fat herbal paneer, drumstick leaves incorporated paneer low fat low calorie ice creams have been developed.

Functional foods like noodles, *paratha*, *saag*, *papad*, *gatta dal* were made from underutilized plants.

Preparation of fenugreek seeds flour and incorporation in semolina for development of nutritious *idli* .

Flaxseeds incorporated *chilla*, *vada*, *chakli* and muffins were developed. Low calorie desserts- custard, sweet curd and *lauki kheer* using stevia were also developed.

Technology transferred/adopted through Extension activities

- Use of dehydrated leaves for low cost nutritious and indigenous product preparation eg. *Mathri*, *lachha*, *chakli*, *sev*, *pharra*.
- Dyeing and printing techniques for fabric enrichment for product development
- Embroidery stitches and garment construction methods.

