ICAR-National Agricultural Higher Education Project

Project Report (up to December 31, 2023)

Component1b: National Agricultural Higher Education Project

<Project Title>Centres for Advanced Agricultural Science and Technology on Nutritional Crops (CAAST-NC)

Chandra Shekhar Azad University of Agriculture & Technology, Kanpur

Name of the AU: Chandra Shekhar Azad University of Agriculture & Technology, Kanpur

Project Title: Centre for Advanced Agricultural Science and Technology on Nutritional Crops (CAAST-NC)

Executive Summary:

Sub Component: Seed Production of Field Crops

The project on "Centre for Advanced Agricultural Sciences and Technology on Nutritional Crops" was started in the year 2018-19. The project is consisting of three components i.e. Seed Production of Nutritional crops, Protected/Off Season cultivation of Vegetables and Harvest Plus.

Under the Seed Production of Nutritional crops component, the technical and physical resources and linkages with other organisations were established for enhancing research capabilities, developing of soft skills; entrepreneurial skills and sharing of technology and Knowledge.

28 national training/ Brain storming/ mentoring programme/ exposure visit/webinar were organized including on campus and off campus both. A total of 4702 candidates have been trained. More than 125 resource persons of the different organisations were invited for delivering the talk and sharing the experiences.

1677 candidates from more than 45 different organisations had participated in the various capacities building programme organized. More than 1200 farmers participated in the training programme.

The various training programmes were organized to enhance the research capabilities, technical skills, soft skills and entrepreneurial skills of PG students. The teaching skills of the faculty are also improved.

A total of 06 PG students had qualified ASRB NET examination and 04 had qualified ASRB ARS Pre examination from 2018-19 to 2020-21.

Sub Component: Harvest plus Value addition and Bio-fortification.

Training is a short term educational process and utilizing a systematic and organized procedure by which students and faculty learn technical knowledge and skills. The harvest plus component organized total four online/ offline training programme viz brainstorming, two days and twenty one days offline training &one week online training due to covid-19. The 278 participants attained the online/ offline training in all over the state, national and International Universities. Cowpea and mung bean have selected pulses for research and developed value added products. Master three students have done research work under the CAAST- NC project. These products have developed through low cost technology. These products have high nutritional value Vitamin, Calcium, iron, protein, fibre and good acceptability.

Sub Component: Protected/Off season cultivation of Vegetables

The project on "Centre for Advanced Agricultural Sciences and Technology on Nutritional Crops" was started in the year 2018-19. The project is consisting of three components i.e. Seed Production of Nutritional crops, Protected/Off Season cultivation of Vegetables and Harvest Plus. Under the Protected/Off Season cultivation of Vegetables component the technical and physical resources and linkages with other organisations were established for enhancing research capabilities, developing of soft skills; entrepreneurial skills and sharing of technology and

Knowledge. 22 national training/ Brain storming/ mentoring programme/ exposure visit/webinar were organized including on campus and off campus both. A total of 1782 candidates have been trained. 96 resource persons of the different organisations were invited for delivering the talk and sharing the experiences. 675 candidates from more than 45 organisations different had participated in the various capacities building programme organized. 14% female and 86% male candidates had participated in the various training programme. Under the social parity 39.35% UR, 47.54% OBC, 10.45% SC, 2.31% ST and 0.35% PH candidates were trained. The various training programmes were organized to enhance the research capabilities, technical skills, soft skills and entrepreneurial skills of PG students. The teaching skills of the faculty are also improved. A total of 12 PG students had qualified ASRB NET examination from 2018-19 to 2020-21. The Physical infrastructures of the university farm have improved due to which approximately 10-15% of the quality vegetable production has increased. Thus the receipt of the university has increased. Two linkages with International Institute *i.e*, Kasetsart University, Thailand and three linkages with IARI, New Delhi, IIVR, Varanasi, Uttar Pradesh and ICAR- NIPB, New Delhi have been established which provide opportunities to excess of technology and resources for conducting research.

Introduction

Seed Production of Field Crops

Quality seed provides foundation to productive agriculture, be it crop husbandry, horticulture or fisheries. It constitutes the very basic and cheapest input and plays seminal role to enhance agricultural productivity and production as well, which has been revalidated recurrently over years across locations globally. Without good seed, the investment on fertilizer, water, pesticides and inputs does not yield desired dividends; rather other inputs of technology are contingent upon quality seed for being optimally effective. Simply by using quality seed alone 15-20% yield increment has been observed in different crops and under optimum management with recommended input the productivity may increase upto 40-50%. In essence, since it is as biological industry, productive agriculture depends upon good seed and vice-versa. One cannot exist or advance without the other. The pace of progress in food production is largely depend upon the progress of seed programme with which a country is able to multiply and market good quality seed of high yielding varieties with superior genetics. It is therefore essential to make quality seed available to the farmers at the right place, in right time at cheaper rate.

The agricultural sector is highly dependent on the availability of quality seeds for productive harvest hence, tremendous efforts have been made in order to increase the quantity and quality of seeds with the help of available technology and agricultural methods. In spite of all best efforts rendered, there is still short supply of quality seeds to end stakeholders due insufficient infrastructure, technology and trained manpower and lack of awareness; therefore, there is dire need to develop technology and technically skilled scientific force for quality seed production. Additionally, awareness drive for technology transfer is also needed for doubling the farmers income through use of quality seed. Considering the fact, present proposal was submitted to the funding agency.

OBJECTIVES:

1. Scaling up the capacity building of the faculty for enhancing their research and teaching capabilities to impart advanced knowledge to P. G. students in area of Nutritional Crops.
2. To provide advance technical trainings/exposure visits to P.G. students at national agricultural institutes/organisations for up-gradation of skill to make them industry ready and next generation researches.
3. To develop a "Knowledge Hub on Nutritional Crops" at national level, as an advance training centre to upgrade the knowledge and skills of various stake holders through the certificate courses for development of human resources enabling them for agri-entrepreneurship and industry ready.
4. To develop vibrant linkages with national/ international/private organizations for sharing of knowledge, promoting innovations and speeding up transfer of technology to end users.

Sub Component: Harvest plus Value addition and Bio-fortification.

The world population was continuously increasing suffer from a lack of food for fulfill the stomach ofworld population. Bio-fortification can play important role in this situation and can be play a vital role toovercome malnutrition. Value addition means

increasing the quality of a natural product by differentprocessing and packaging techniques. Value addition of product can be improved its physical andnutritional quality of a product and play a vital role for enhancing the shelf life as well as economic valueof a product.

Harvest plus Value Addition and Bio-fortification component resolves around enhance the educational relevance and quality of value added products. Value addition or fortification was the main theme of research work. Value addition is a great way to increase the shelf life, enhance nutritive value of the products along with adding economic value to it. These value added products have high protein, carbohydrate content and relatively low in fat content and also be useful to combat malnutrition and prevention of chronic diseases. Harvest plus value addition and bio-fortification component organized lectures during online / offline training programmes. The students have a great opportunity to increase skills.

Key objectives:

1. Scaling up the capacity building of the faculty for enhancing their research and teaching capabilities to impart advanced knowledge to P.G. students in area of nutritional crops.
2. To provide advance technical trainings/exposure visits to post graduate students for up-gradationof skills to make them industry ready and next generation researches.
3. To develop a "Knowledge Hub on Nutritional Crop" at National level, as an advance trainingcentre to upgrade the knowledge and skills of various stakeholders through the certificate coursesenabling them for agri-entrepreneurship and industry ready.
4. To develop vibrant linkages with national/international/ private organizations for sharing ofknowledge, promoting innovations and speeding up transfer of technology to end users.
5. It helps in providing personalized courses to identify their weakness and strengths for betterlearning outcomes.
6. To Prepare the fortified and low cost food products and impart knowledge and skills through the advance training

Sub Component: Protected/Off season cultivation of Vegetables

In India, protected cultivation has been adopted in more than 100000 hectares mostly covering horticulture crops like vegetables, flowers, herbs, mushrooms, plant nurseries and others. Out of this acreage almost half of the area is under vegetables and their nurseries multiplication. The states and union territories adopting protected cultivation in the country have being increasing. The phase-wise implementation of protected cultivation has bolstered the adoption of protected cultivation across the country. Now a days almost all states in the country are adopting protected cultivation of Vegetable crops. Combined efforts of the different organizations have created awareness on protected cultivation of vegetables. These organizations are providing financial assistance to the farmers to adopt protected farming for vegetables and other horticultural crops. The states that have consistently expanded the area under protected cultivation are Andhra Pradesh, Gujarat, Maharashtra, Haryana, Punjab, Tamil Nadu and West Bengal. The subsidy schemes, international collaboration with countries such as Israel, Netherlands are expected to act as a major boost for the protected cultivation in India. The only major challenge for the adoption of the protected cultivation is the cost of the structures and lack of awareness and production knowledge. If these aspects are taken care of by the scientists, industrial players and

the policy makers, the extension agencies then the protected cultivation industry will showcase remarkable growth in near future (www.marketresearch.com) as it has done in other county like China making her largest producer of vegetables in the world. Protected cultivation can prolong the harvest period, increase yield, quality improvement, and keep the availability of commodities round the year. A project study reported the estimated net annual return from Rupees 9.0 to 11.7 lakhs / year / ha in naturally-ventilated greenhouses for growing tomato, capsicum and cucumber. U.P. ranks second in vegetables and first in potato production among all states of the country. The major vegetables grown in the state are-peas, chilies, okra, tomato, brinjal, cauliflower, cabbage, palak, radish, carrot, turnip melons and other cucurbits. The state has about alac hectare under various vegetable crops. Thus U P is an important state to contribute to the progress of vegetable crops in the country. Indian Several technologies like improved seeds, planting material, hybrids, micro-irrigation, integrated pest and nutrient management, provisioning of protected plant production technologies, efficient harvesting and post-harvest management are available in the state or elsewhere in the country for increasing production and productivity of vegetable crops for the achieving objective of high yields and quality. Due to climate change farmers suffer frequently from uncertain weather and erratic monsoon taking toll on their crops. One way to safeguard against these is through protected cultivation. Protected cultivation involves use of custom-made or self-made poly houses, shade nets, insect nets, bird protection nets, anti-hail nets, plastic mulch and similar devices which augment the quality and productivity of the vegetable crops resulting in higher profits to the farmers. This technology is potential for enhanced productivity and profitability in vegetables. This technology has been adequately tested and established in Tamil Nadu, Maharashtra Karnataka, Punjab, Haryana, Himachal Pradesh, Ladakh, Uttarakhand, North Eastern States. The major crops grown under protected cultivation are tomato, capsicum, cucumber, squash, melons, cabbage, cauliflowers, and leafy vegetables. Protected cultivation in UP has progressed as in other states. Modern climate controlled green houses are part and parcel of protected cultivation.

A. OBJECTIVE:

1. Scaling up the capacity building of the faculty enhancing their research and teaching capabilities to impart advance knowledge to P.G students in area of nutritional Crop;
2. To provide advance technical trainings/ exposure visit to post graduate students at national agricultural institutes/ organization for up gradation of skills to make them industry ready and next generation researches;
3. To develop a “Knowledge Hub on Nutritional Crop” at National Level, As an advance training centre to upgrade knowledge and skills of various stake holder through the certificate courses for development of human resources enabling them for agri-entrepreneurship and industry ready, and
4. To develop Vibrant Linkages with national / international/ private organizations for Sharing of Knowledge, promoting innovations and speeding up transfer of technology to end users.

1. Key activities carried out under the project during the entire period

1.1. Interventions carried out by AU which helped to improved research effectiveness

Please provide the details about the interventions carried out to support inter-disciplinaryadvanced centers for innovative teaching, research, extension, and capacity building in thespecialized area for holistic development and integrating agricultural education withemployment and entrepreneurship for PG students. Please write one paragraph for each interventions and/or activities.

Sub Component: Seed Production of Field Crops

Key interventions	*Remarks/Photographs*

Name of Student: Rashmi Priyanka,
Id. No.: CA-10228/16, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

An experiment was conducted on "*Studies on effect of containers and botanicals on longevity of pigeon pea [Cajanus cajan (L.) Millsp.] seed under ambient storage condition*". The freshly harvested seeds of pigeon pea var. Pusa 991 was subjected to different 11 treatments and packed in two pervious and non pervious containers and stored under ambient conditions. Bimonthly observations was recorded on various seed quality parameters and data were subjected to statistical analysis to draw valid conclusions. Highest standard germination (82.06), seedlings length (24.8 cm), seedling dry weight (0.36mg/10 seedling) and seedling vigour index I & II (2053 & 30.03, respectively) were observed in T_8 (turmeric powder) followed by deltamethrin (T1) at 10 month storage. Polythene bag showed better performance as compare to cloth bag by scoring highest values for all parameter except insect infestation and moisture content where it were least. Polythene bag and treatment- T_1, T_2, T_8, T_9 and T10 had recorded standard germination above MSCS level for 10 month storage period but among these treatment T_8 (turmeric powder) was found to be best followed by deltamethrin (T_1). Polythene bag (P_2), botanical-turmeric powder (T_8) and combination P_2T_8 may be recommended for safe storage of pigeon pea variety Pusa 991 under ambient storage condition of Kanpur.

Name of Student: Pratiksha Singh,
Id. No.: CA-10203/16, Ph.D
Name of faculty/Component Co- PI: Dr. C. L. Maurya

The present investigation entitled "Evaluation of Multi-walled Carbon Nanotubes to Enhance Seed Quality and Seed Yield of Soybean [*Glycine max* (L.) Merrill]" was carried out to assess the effect of multi walled Carbon Nanotubes on seed quality attributes by two protocols ie., Nano-priming and Nano-coating of soybean varieties PS-1225 and PS-1347 at the Seed Testing Laboratory, Department of Seed Science and Technology, Chandra Shekhar Azad University of Agriculture and Technology and field the experiment were taken to study the effect of nanotubes and seed yield attributes of soybean varieties PS 1225 and PS-1347 during Kharif 2018 and Kharif 2019 at Crop Research Farm, Kalyanpur, Chandra Shekhar Azad university of Agriculture & Technology, Kanpur. It is concluded that on the basis of yield and yield attributes under pot culture and field condition, treatment C_2 (4.0 µ gm) coated with CNT method gainfully used in soybean crop

production. However, seed coating may be preferable as it may be better complied with biosafety and environmental sustainability issues

Name of Student: K. Revathi,
Id. No.: CA-10638/17, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

An investigation was conducted on *"Studies on Effect of Seed Invigoration Treatments on Seed Quality of Okra* [*Abelmoschus esculentus* (L.) Moench]" to find out the better treatments that enhances the standard germination, seedling growth, seed vigour and field emergence of okra cv. Azad Bhindi- 1. Both freshly harvested seeds and a year old seeds were treated with plant growth regulator viz. GA_3 (50 &100 ppm), hydro-priming (4, 8 & 12 hrs), bio-agent like *Trichoderma* @ 10g/ kg seed, fungicide- Thiram, combination of hydro-priming with fungicide for varying time periods (4, 8 & 12 hrs + Thiram @ 2g/ kg), combination of fungicide and bio-agent (Thiram @ 2g/ kg + *Trichoderma* @ 10g/ kg), chemical KNO_3 @ 1.0 per cent along with control. The experiment was conducted in Completely Randomized Design in the laboratory and Randomized Block Design in the field with four replications. Observations were recorded and analyzed for standard germination, speed of germination, root length, shoot length, total seedling length, seedling dry weight, seed vigour index (SVI) and field emergence. The results reveals that the seed invigoration treatments applied had significant effect on standard germination, seedling growth and seedling vigour index in both fresh and aged seed category. The treatments T_{10} (GA_3 50 ppm) followed by *Trichoderma* @ 10 g/kg (T_7) and GA_3 100 ppm (T_{11}) had produced highest standard germination (72.75 per cent), shoot length (15.173 cm), root length (9.75 cm), total seedling length (24.92 cm), seed vigour index - I & II (1812.94 & 14.64) and field emergence (67 per cent) under aged seed lot. Almost similar results were produced by fresh seed category. But the effect of treatments was more pronounced on aged seed category as compared to fresh one. The highest increment of 14.43 per cent (standard germination), 22.55 per cent (speed of germination), 34.89 per cent (root length), 20.60 per cent (shoot length), 26.19 per cent (total seedling length), 26.86 per cent (seedling dry weight), 36.84 per cent (seedling vigour index-I), 37.38 per cent (seedling vigour index-II) and 26.49 per cent (field emergence) was recorded in the treatment GA_3 50 ppm followed by *Trichoderma* @ 10 g/kg seed & GA_3 100 ppm while lowest in control of aged seed category. In nutshell, the treatment GA_3 50 ppm was found to be significantly superior among all in increasing seed germination, seedling growth and vigour. The treatment GA_3 50 ppm was found to be significantly superior among all in increasing seed germination, seedling growth and vigour followed by *Trichoderma* 10g/kg and GA_3 100 ppm.

Name of Student: Rishabh Kumar Singh,
Id. No.: CA-10618/17, Ph.D
Name of faculty/Component Co- PI: Dr. C. L. Maurya

The present investigation entitled “Influence of Micronutrients Application on Seed Yield and Seed Quality Attributes of Mung Bean [*Vigna radiata* (L.) Wilczek]” was carried out during two consecutive years i.e. *Kharif*-2018 &*Zaid*-2019 and *Kharif*-2019 &*Zaid*-2020 at New Dairy Farm, Kalyanpur, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The treatment combinations comprised with three levels of zinc *viz*., 0, 10 and 25 kg ha^{-1}, three levels of boron *viz*., 0, 5 and 10 kg ha^{-1} as soil application and three levels of molybdenum *viz*., 0, 5 and 10 g/kg as seed treatment were

evaluated in Factorial RBD design with three replications. The tested variety of Mung Bean was Sweta. The results revealed that the maximum number of root nodule (18.94 and 20.84), plant height (62.59 and 39.03 cm.), number of clusters per plant (5.72 and 10.34), number of pods per cluster (4.63 and 5.20), number of pods per plant (37.95 and 49.42), minimum days to initiation of flowering (31.44 and 35.83 days), days to 50% flowering (33.39 and 38.56 days) and days to initiation of poding (33.28 and 37.89 days) during *Kharif* and *Zaid* was recorded from the treatment combination of 10 Kg Zn ha^{-1} × 5 Kg B ha^{-1}.The results based on data revealed that out of twenty seven treatments, the combination of 10 Kg Zn ha^{-1} × 5 Kg B ha^{-1} enhanced morpho-physiological, yield and yield attributing properties of Mung bean *var*. Sweta.

Name of Student: Kamisetti Harshana,
Id. No.: CA-11057/18, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

The present investigation entitled "Augmenting Seed Yield and Seed Quality of Mungbean [Vigna radiata (L.)Wilczek] through Foliar Application of Micronutrients" was carried out to study the effect of foliar spray of various micronutrients on seed yield and seed quality of green gram variety Sweta and Virat during the Zaid 2019 at Crop Research Farm, Nawabganj, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The treatment combinations comprising of 0, 0.5 and 1.0 per-cent of each micronutrient namely Zinc, Magnesium and Iron were evaluated in Nested Design with three replications. The micronutrients were grouped into three groups viz., Group 1 (Zine), Group 2 (Magnesium) and Group 3 (Iron).The dose 1.0% of zinc, magnesium and iron have been found to be the most appropriate for increasing the seed quality attributes of mungbean var. Sweta (V_1) and Virat (V2). The interaction of micronutrients (1.0% zinc, magnesium and iron) with varieties had significantly influenced most of the seed quality attributes. Hence, 1.0% spraying of zinc, magnesium and iron at 20 & 35 DAS may be recommended to seed growers for realizing maximum yield and seed quality of mungbean varieties sweta and virat.

Name of Student: Pawan Kumar,
Id. No.: CA-10821/18, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

An experiment was conducted on entitled “Studies on Seed Vigour in Relation to Field Emergence in Lentil (*Lens culinaris Medic.)*”. To find out the best method(s) of vigour assessment in lentil crop at seed testing laboratory, Department of Seed Science and Technology, Chandra Shekhar Azad University of Agriculture and Technology Kanpur during 2019-2020. Seven genotypes of lentil crop were taken from Seed Processing Unit of Chandra Shekhar Azad University of Agriculture and Technology Kanpur during the year 2019. The genotype KLB-2008-4 exhibited best performance regarding 1000 seed weight, seed volume, root length, germination index, seed vigour index in relation to seedling dry weight and field emergence test. The genotype KLS-122 gave best performance in electrical conductivity, shoot length and seedling length. The genotype K-75 found to be superior in seed viability, seed vigour index in relation to seedling length, brick gravel and paper piercing test while genotype KL-320 in seed density, genotype KLB-345 in seedling dry weight & first count and genotype KLB-303 in standard germination percentage. The

vigour test methods like, seed weight test, seed volume test, seedling dry weight, seed viability test, seed vigour index in relation to seedling dry weight, leachate test, first count test, standard germination test and brick gravel as well as paper piercing test may be used in predicting the stand establishment potential of lentil genotype under varied stress environment condition.

Name of Student: Sanjay Babu,
Id. No.: CA-11259/19, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

The present investigation entitled "Studies on Seed Vigour in Relation to Field Emergence of Wheat (Triticum aestivum L.)" was carried out during the year 2020-2021. The experiment was conducted in the Department of Seed Science and Technology, Chandra Shekhar Azad University of Agriculture and Technology Kanpur to find out the vigour differences among different genotypes of wheat crop and to estimate the co-efficient of correlation (r) of different vigour tests to field emergence. The results based on different seed testing methods, seed viability test, first count test, standard germination test, brick gravel and paper piercing test were found to be significant and positively correlated to field emergence. Hence, these tests can be recommended for vigour estimation of wheat in laboratory. On the basis ofthe genotypes PBW-723 followed by K-1317, K-9107 & K-1006 were found to be superior when tested for various vigour test.

Name of Student: Dilip Kumar Sahu,
Id. No.: CA-11259/19, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

An experiment was conducted to find out the best method(s) of vigour assessment Mustard at Seed Testing Laboratory, Department of Seed Science and Technology, Chandra Shekhar Azad University of Agriculture and Technology Kanpur during 2020-2021. Seven genotypes of Mustard were taken from Seed Processing Unit of Chandra Shekhar Azad University of Agriculture and Technology Kanpur during the year 2020.Mustard [*Brassica juncea* (L.) Czearn & Coss.] is important oil seed crop belongs to Cruciferae family. The results revealed that the Seed test weight, seed volume, shoot length, root length, fresh weight, dry weight of seedling, seed density, Tz-test, germination index, vigour index-I & II, standard germination first count test have been found to be positively correlated with field emergence which indicates that these tests may be employed for vigour assessment of mustard in laboratory condition.

Name of Student: Reetesh Gupta,
Id. No.: CA-11638/20, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

An experiment was carried out during 2020-2022 on "Influence of Hydropriming and Growth Regulators on Germination and Seedling Growth of Tomato (*Solanum lycopersicum* L.)" to find the appropriate level of hydration and growth regulators to enhance the germination percent and seedling growth in Tomato. Freshy harvested tomato seed cv. Azad T6 were soaked in growth regulators viz. GA3, IAA, IBA, NAA, KNO, with 50 ppm and 100 ppm concentration of each growth regulators and 6 and 12 hours hydropriming with water. The experiment was conducted in Completely Randomised Design with four replications. The result showed significant effect of different level of growth regulators and hydration treatment on germination and seedling growth. Most of the treatment exhibited statistical

superiority over the control. Though values recorded in control and hydropriming 12 hrs for the parameters root length, seedling length, seedling fresh weight, seedling dry weight and SVI-I were found to be non significant. The 100 ppm solution showed superiority to 50 ppm treatment for all characters studies. GA3 100 ppm recorded highest standard germination and seedling growth among all the treatment. The invigoration treatment with 100 ppm GA3 showed high increment in standard germination percentage (92.99) over the control.

Name of Student: Arpit Kumar,
Id. No.: CA-11633/20, M.Sc.
Name of faculty/Component Co- PI: Dr. C. L. Maurya

An experiment was carried out on "Seed quality enhancement through invigoration in Bottle Gourd cv. Kalyanpur long green (*Lagenaria siceraria* (Mol.) Standl.)" During 2021 2022 to find the appropriate level of hydration and growth regulators to enhance the germination per cent and seedling growth in Bottle gourd. The freshy harvested seed of Bottle gourd cv. Kalyanpur long green was treated with two doses 50 ppm and 100 ppm of plant growth regulators viz, GA3, IAA, IBA, NAA and KNO), Seed were also subjected to hydration treatment of 6 hrs and 12 hrs. The experiment was conducted in Completely Randomized Design with four replications. The result showed significant effect of different level of growth regulators and hydration treatment on seed germination and seedling growth. All the treatment exhibited statistical superiority over control except NAA. Among all the growth regulators and hydropriming, GA; 100 ppm was found to be best in enhancing seed germination, seedling growth and seed vigour index.

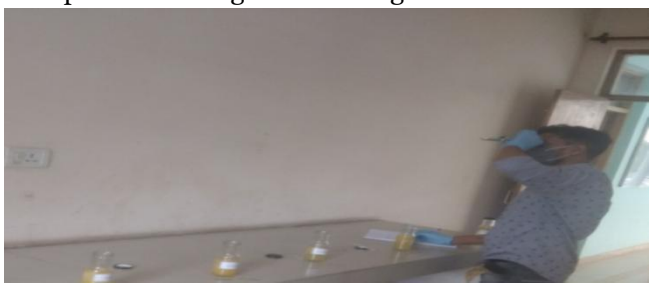
Sub Component: Harvest Plus Value Addition & Bio-fortification

Key interventions	*Remarks/Photographs*
Training	
Brain-storming Session on "Bio-fortification Towards Food Security-2019" February 21, 2019	*One day session and it was the first activity in CAAST project*
Advance technology of food processing (16-17) March,2019	*Two days training Program* Why Food Fortification Discussed in Details about the Food Processing Technology of Fortified Crops" explaining the techniques to double the income of farmers and provided information regarding the Role of Nanotechnology in Food.
Recent Advances in Functional and Nutraceuticals for Future Foods8-28 July, 2019	*Twenty one days training program conducted in the university experienced meritorious and renowned scientist came from the different Institute of India as Deputy Director NIN, Hyderabad, NIFTEM, Sonepat Haryana and CFTRI, Mysore,* Dr. S Thiruchenduran from Sri Lanka made presentation on nanotechnology in functional foods fish oil nano-lamination. Dr. Sreenlvasa RJ made presentation on composition of GLV, vegetable and fruits help to eradicate micronutrient deficiencies. Dr. R. Ananthan explained Indian Food composition tables. Dr. C V Ratnavathi made presentation on nutritive value of millets and their derived health benefits. The total 67 lectures has been covered under 21 days training program.

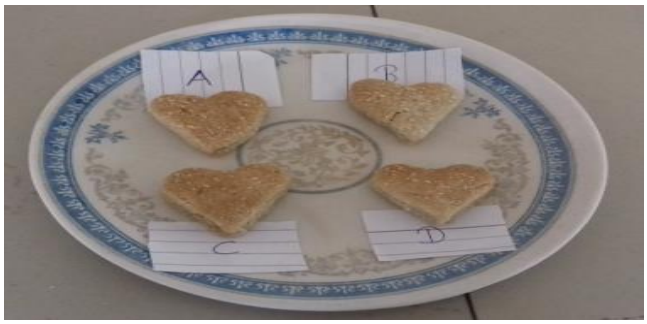
Recent technologies of food packaging **13 -17 Sep, 2020**	One Week e-training program was conducted during covid period.
National level Awareness Program on Entrepreneurship Development in Agriculture and allied Sectors -2021 Jointly organized by Government of India Ministry of MSMEDevelopment Institute, Kanpur &Department of Food Science & Nutrition CAAST-NC One Day 23 Nov,2021	*The director and Deputy Director of MSME given very enthusiast lecture on entrepreneurship.*
An Awareness Program on Digital Library for strengthening Agriculture Knowledge In NARES One Day26 Nov,2021	*Dr. Amrendra Scientist IARI New Delhi provide a informative lecture on digital library.*
one day Webinar on Food Quality & Policy :Their Implementation In Public Distribution System one day 28th July 2021	*Scientist provide a very informative lecture on food policy and public distribution system*
National Conference on Moringa Food Conclave -2021 28th -29th September,2022	*Online National Conference organized on Moringa food conclave which is rich in nutraceutical properties*

Development of Jamun Seed Powder biscuits

Development of Mango-Aonla-Ginger



based RTS Beverages



Fortified Banana flour biscuits

Sub Component: Protected/Off season cultivation of Vegetables

Key interventions with Remarks/Photographs

Name of Student: Vipul Pratap Singh,
Id. No.: HR-0238/17, Ph.D
Name of faculty/Component Co- PI: Dr. D.P. Singh

The present investigation was carried outat the Vegetable Research farm, Chandra Shekhar Azad University of Agriculture and technology, Kanpur to find out the effect of micronutrients and PGR on growth, yield and quality of tomato (*Solanum lycopersicum* L.). Different plant growth regulators *i.e,* GA_3 and NAA and micronutrients *i.e,* $ZnSO_4$, Boric acid and $FeSO_4$ on growth, yield and quality parameters of tomato. The results based on data revealed that out of 11 treatments, the treatment T_2 *i.e*, application of GA3 100ppm followed by treatment T_1 *i.e*application of GA_3 50ppm) resulted in the maximum plant height (119.09 cm), flower cluster (7.35), maximum no. of fruit plant^{-1} (36.27), average fruit weight 62.59 g, maximum fruit yield plant^{-1} 2.270 kg, maximum days of self life at ambient room temperature (14.95), minimum fruit cracking, fruit dropping was recorded in treatment T_2:GA3 100ppm followed by T_1:GA3 50ppm. On the basis of economic feasibility, it may be concluded that the application of @ GA3 100ppm is more viable for higher growth, yield, quality and also for highest benefit cost ratio.

Name of Student: Pranjal Singh, Msc.,
Id. No.:HR-0287/18, Msc
Name of faculty: Dr. Rajiv

Bitter gourd, important vegetable crops of family cucurbitaceae. Boron, zinc and copper normally result in premature floral abscission that leads to failure of seed set. An experiment was carried out at the Vegetable Research farm, Chandra Shekhar Azad University of Agriculture and technology, Kanpur during Kharif season 2019 to study the Effect of foliar feeding of micronutrients on growth yield and quality of bitter gourd on growth, yield, quality and economic feasibility with fifteen treatments in randomized block design replicated thrice. The results based on data revealed that out of fifteen treatments, the application of mixture of all micronutrients being at par with multiplex @4 ml/l (commercial formulation) sprayed at 40, 50, 60 DAS (days after sowing) resulted in the maximum length of vines (3.52 m),fruit length (23.94 cm), fruit girth (9.26 cm), fruit weight/vine (1.51 kg), yield (99.68 q/ha), TSS content in fruits (5.45 0Brix) and B:C ratio (3.42). On the basis of economic feasibility, it may be concluded that the mixture of all the micronutrients as well as multiplex (commercial formulation) alone is more viable for higher growth, yield and quality of bitter gourd.

Name of Student: Mokil Ahmad,
Id. No.: HR-0270/18, M.Sc.
Name of faculty/ component Co- PI: Dr. D.P. Singh

An experiment entitled “Effect of foliar application of micronutrients (Zinc and Boron) on growth, yield and quality of tomato (Lycopersicon esculentum Mill.) cv. NS-4266 under insect proof net house” was carried out during Rabi 2019-20 at Vegetable Research Farm, Department of vegetable science, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. Three levels (0%, 0.1%, 0.2%) of zinc and boron were evaluated against growth, yield and quality of tomato cv. NS-4266. The results revealed that maximum plant height at 60 DAT (168.12 cm.) and at final harvesting stage (348.33 cm.), number of clusters per plant (8.30), number of fruits per cluster (11.12), stem girth (3.20 cm2), minimum days to first flowering (32.00 days), days to first fruiting (48.00 days) and days taken to first picking (112.00 days) was recorded from the treatment Zn2B2 (i.e., 0.2% Zinc+ 0.2% Boron). The data on yield parameters showed that the maximum number of fruits per plant (92.28), polar diameter of fruits (4.89 cm.), equatorial diameter of fruits (5.76 cm.), Average weight of fruits (88.12 gm.) and yield per plant (7.64 kg.) was obtained from the application of treatment Zn2B2 (i.e., 0.2% Zinc+ 0.2% Boron). All the treatments are found superior over control (Zn0B0) on the basis of growth, yield, quality of tomato and economics.

Name of Student : Mahendra Kumar Yadav
Id. No.: HR-0288/18, Ph.D
Name of faculty/ component Co- PI: Dr. D.P. Singh

Pumpkin (Cucurbita moschata Duch ex Poir, 2n = 2x = 40) is an economically important vegetable crop. The evaluation of the parents for their ability to transfer desirable genes to their off-springs is an important pre-requisite for planning of a systematic plant breeding programme which aimed to develop superior strains or varieties. The present investigation "Heterosis, combining ability, gene action for yield and quality traits in pumpkin (Cucurbita moschata Duch. Ex Poir.)" will be carried out with 66 treaments (8 Parents, 28F1s +28F2s + 2 check varieties) in half diallel mating design with three replications. One experiments were completed in which among 28F1's, Narendra agrim x Azad pumpkin-1 and Kashi harit x NDPK-1 was identified as best cross for higher fruit yield in respect to check variety i.e, kasha harit and Narendra agrim. Other results in progress

Name of Student :, Arun Kumar Verma
Id. No.: HR-0280/18, Ph.D
Name of faculty/ component Co- PI: Dr. K.P. Singh

Bottle Gourd (Lagenaria siceraria (Molina) Standley) is important cucurbitaceous vegetable. In Any breeding programme, knowledge of gene action, combining ability is a powerful tool in the selection of superior parents and identification of superior cross combinations. The present investigation "Heterosis, Combining ability and Gene Action for Quantitative and Qualitative traits in Bottle Gourd (Lagenaria siceraria Mol. Standl.)" will be carried out with 36 treaments (28 F1 hybrid, 8 lines). Among the parental lines Pusa Santhusthi perform better. Other results in progress.

Name of Student :, Kuldeep Kumar,
Id. No.: HR-0165/16, Ph.D
Name of faculty/ component Co- PI: Dr. D.P. Singh

Brinjal is an important vegetable crops. The present investigation entitled. "Studies on genetic components for some metric traits in brinjal (Solanum melongena L.)". Crosses will be attempted using line × tester mating design at Vegetable Research Farm, Department of Vegetable Science, Kalyanpur, Kanpur during 2016-17. Crosses will made at by taking 4 tester and 12 lines, total number of crosses are 48 and these crosses along with their parents and check varieties will be evaluated in RBD with three replications in 2017-18 and few F1 seeds of each crosses will be selfed during 2017-18 and the final trial will be carried out during 2018-19 including P1, F1 and F2, the same observation will be recorded further. In pooled analysis out of 48

crosses, twenty- one of the F1's showed significant and positive heterosis over mid parent and standard heterosis for total fruit yield per plant respectively.

Name of Student : Meenakshi Kumari,
Id. No.: HR-0166/16, Ph.D.
Name of faculty/ component Co- PI: Dr. A.K.Dubey

YVMV is divesting disease reported in Okra due to which 45-50% yield losses. So, the present investigation entitled "Study on inheritance of YVMV disease, yield and quality related characters of okra (Abelmoschus esculentus L. Moench)" was formulated with a view to find out the best parent combination which is resistance to YVMV and gives higher yield with quality fruits. Total 102 (10 parents + 45 F1s + 45 F1s +2 checks) treatments were evaluated during three season. For all treatments PCV was slightly higher than its corresponding GCV for all the characters studied. Among all crosses, IIVR-11 X VRO4 gives highest yield with less incidence of yellow vein mosaic virus

Name of Student : Nagendra Kumar
Id. No.: HR-0273/18, M.Sc.
Name of faculty/ component Co- PI: Dr. Sanjeev Kumar Singh

An experiment entitled ' Effect of Biofertilizers on growth, yield and quality of Chilli (Capsicum annum L.)' was laid out at the Vegetable Research farm, Chandra Shekhar Azad University of Agriculture and technology, Kanpur during Kharif season 2019 in RBD design with three replications in variety G-4 (Bhagyalakshmi). 9 treatments i.e, T1: Control (No. Biofertilizers and Chemical fertilizers), T2: Azospirillum @ 5kg/ha as soil application, T3 : VAM @ 10 kg/ha as, T4: Azospirillum @ 5 kg/ha + VAM @ 10 kg/ha, T5: 25% RDF + Azosprillum @ 5 kg/ha + VAM @ 10 kg/ha, T6: 50% RDF + Azosprillum @ 5 kg/ha + VAM @ 10 kg/ha, T7: 75%RDF + Azosprillum @ 5 kg/ha + VAM @ 10 kg/ha, T8: 100% RDF + Azosprillum @ 5 kg/ha + VAM @ 10 kg/ha and T9: 100% RDF only (without Biofertilizers) all as soil application. Among all the treatments highest net returns (Rs.1,01,596 ha-1), B:C ratio (2.24:1) and maximum number of fruits per plant (140.41), fresh fruit yield per plant (278.80 g), dry fruit yield per plant (59.30 g) and dry fruit yield per hectare (23.05 q) were recorded with the application of 75 per cent RDF + Azospirillum + VAM.

Name of Student :, Ram Jeeeven,
Id. No.: HR-0209/17, M.Sc.
Name of faculty/ component Co- PI: Dr. D.P.Singh

An experiment entitled "Effect of foliar feeding of micronutrients (Zinc and Boron) on growth, yield and quality of tomato (Lycopersicon esculentum Mill.) was conducted at the Vegetable Research farm, Chandra Shekhar Azad University of Agriculture and technology, Kanpur during the year 2018-19. Application of Zinc and Boron at different concentration i.e, Zinc @ 0%, 0.30%, 0.40% & 0.50% and boron @ 0.0%, 0.25%, 0.40%,& 0.50% and compare with control in three replication in RBD design. Among all treatments Zinc @ 0.50% and boron @ 0.50% found best.

Name of Student : Shreya Awasthi,
Id. No.: HR-0201/18, M.Sc.
Name of faculty/ component Co- PI: Dr. D.P.Singh

An experiment entitled "Assessment of genetic variability, correlation and character association in okra genotype for yield and contributing characters" was conducted at the Vegetable Research farm, Chandra Shekhar Azad University of Agriculture and technology, Kanpur during the year 2018-19. Total 16 genotypes + 2 checks were evaluated to identify best genotypes in relation to yield and qualitative characters. Among the genotypes, Kashi Kranti (353.53 gm) gave best yield while VRO-4 produced long fruit (11.20 cm).

Name of Student: Richa Tiwari,
Id. No.: HR-0351/19
Name of faculty/ component Co- PI: Dr. D.P. Singh

The present investigation will be carried out to find out the Effect of plant growth regulators on growth, yield and quality parameters in sweet pepper *(Capsicum annum* L.) under naturally ventilated polyhouse. Study will be carried in the Department of Vegetable Science, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (U.P) during 2019-20 and 2020-21. Two different growth regulators with two different concentrations are used *i.e,* NAA @ 50ppm, NAA @100ppm, Tricontanol @ 5ppm and Tricontanol @ 10 ppm spray at 03 different intervals. Results: Awaited

Name of Student: Mr.Virendra Kumar,
Id. No.: HR-0346/19
Name of faculty/ component Co- PI: Dr. Rajiv

The present investigation will be carried out to find out the Studies on effect of foliar application of plant growth regulators on growth, yield and fruit quality traits in tomato (*Lycopersicon esculentum* Mill.) under protected condition. Study will be carried in the Department of Vegetable Science, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (U.P) during 2019-20 and 2020-21. Three different growth regulators with three different concentrations are used *i.e,* GA_3 @ 50, 75 & 100 PPM, NAA @ 20, 30 & 40PPM and 4-CPA @ 20, 30 & 40PPM spray at three different intervals. Results: Awaited

Name of Student: HEMANT KUMAR,
Id. No.: HR-0336/19
Name of faculty/ component Co- PI: Dr. D.P. Singh

Thesis/ research title: Effect of foliar feeding of N. P. K. (19:19:19) on growth, yield and quality of Cucumber (*Cucumis sativus* L.) cv. Pusa Seedless Cucumber - 6 under insect proof net house.Results: Awaited

Name of Student: Nasir Mohammad Hamdard,
Id. No.: HR- 0341/19
Name of faculty: Dr. Rajiv

Thesis/ research title: Effect of foliar application of calcium nitrate and Boron and Zinc micronutrients on growth and yield of tomato (*Solanum lycopersicum*L.) under net house. Results: Awaited

1.2. How the facilitative units helped to enhance learning outcomes

Please provide the details of the facilitative units which helped in enhancing learning outcomes of the students and/or faculties. Please note that we may not need to mention all facilitative units created in the AU here, but focus on those which are open for the students/faculties and other stakeholders.

Sub Component: Seed Production of Field Crops

Facilitative unit	*Activity/achievement*	*Remarks/Photographs*
IISR, Kushmaur, Mau, UP	*MoU/Signed/Higher Agricultural Education*	*25 Students got training in IISR, Mau during Feb, 24 to March 09, 2020. Student are getting research input & guidance also.*
U.A.S., Bangalore, Karnataka	*MoU/Signed/Higher Agricultural Education*	*Co-PI Dr. C. L. Maurya joined national workshop held by UAS Bangalore under NAHEP project.*

Sub Component: Harvest plus Value addition and Bio-fortification.

Facilitative unit	*Activity/achievement*	*Remarks/Photographs*
Brain-storming Session on "Bio-fortification Towards Food Security-2019" February 21, 2019	87 : Male (Gen:32 , OBC: 30, SC:07) Female: Gen:10 , OBC: 05, SC:03)	*At end of the page*
Advance technology of food processing (16-17) March,2019	39 Male (Gen:02 , OBC: 01, SC:02) Female: Gen:6 , OBC: 18, SC:10)	
Recent Advances in Functional and Nutraceuticals for Future Foods 8-28 July, 2019	30 Male (Gen:4 , OBC: 8, SC:06) Faculty Female: Gen:8 , OBC: 05, SC:03)	

Recent technologies of food packaging 13 -17 Sep, 2020	122 Students(Male (Gen:10 , OBC: 04, SC:02) Female: Gen:38 , OBC: 25, SC:05) Faculty Male (Gen:10 , OBC: 05, SC:01) Female: Gen:10 , OBC: 08, SC:04)	
National level Awareness Program on Entrepreneurship Development in Agriculture and allied Sectors -2021 Jointly organized by Government of India Ministry of MSME MSME Development Institute, Kanpur &Department of Food Science & Nutrition CAAST-NC One Day 23 Nov,2021	92 Students: 70 Faculty 22	
An Awareness Program on Digital Library for strengthening Agriculture Knowledge In NARES One Day 26 Nov,2021	150 Students:100 Faculty: 50	
one day Webinar on Food Quality & Policy :Their Implementation In Public Distribution System one day 28th July 2021	52 Students:40 Faculty: 12	
National Conference on Moringa Food Conclave -2021 28th -29th September,202	100 Students:70 Faculty:30	
Total	672	

Sub Component: Protected/Off season cultivation of Vegetables

Out-of-box initiatives undertaken by the AU
Please provide the details on out-of-box initiatives undertaken by the AU in one-two paragraph.

Sub Component: Harvest plus Value addition and Bio-fortification.

Out-of-box initiative	*Activity/achievement*	*Remarks/Photographs*
Twenty one days training program	*Candidate Participate national and international in training program*	*At the end*
Brain storming Session	*One brain storming conducted.* Total 87 participants attended this brainstorming session.	
Two days training program	*One training program conducted*	
Online training program	*Two online training program conducted. One day webinar and seven days training*	
One day National training program	*Two offline one day training program conducted*	
Innovative product development	*Millet and Moringa products*	

1.3. Collaborations with industry and other HEIs for bringing relevancy

1.4. Please provide the details on relevant collaboration with industry for bringing relevancy and improving research effectiveness in the AU in one-two paragraph.

Collaborations	*Activity/achievement/purpose*	*Remarks/Photographs*

Sub Component: Harvest plus Value addition and Bio-fortification.		
NIFTEM	Exposure Visit and one week training Students and Faculty exposure visit: One exposure visit (January 27-February 01, 2020) were organizedon “Advanced techniques of Food Processing and Preservation” held in National Institute ofFood Technology Entrepreneurship Management (NIFTEM) Sonepat. In this exposure visit many entrepreneurial opportunities in food processing sector were seen. Many learning opportunities were there for participants. Such as hands on practicals include demonstration of Khoa, paneer, papad,laddu,muffins, bujia and cookies. Industry visit also include Mushroom Research Centre, Yakult plants and Daawat Basmati Rice (L.T. Foods).	
Sub Component: Protected/Off season cultivation of Vegetables		
International		
World Vegetable Centre, Taiwan	*MoU/Signed/Higher Agricultural Education*	
Kasetsart University, Thailand	*MoU/Signed/Higher Agricultural Education*	
National		

ICAR- Indian Institute of Vegetable Research - (*IIVR*), *Varanasi*, Uttar Pradesh	*MoU/Signed/Higher Agricultural Education*	
ICAR- Indian Agricultural Research Institute - (IARI), New Delhi	*MoU/Signed/Higher Agricultural Education*	
ICAR-National Institute for Plant Biotechnology – (NIPB), New Delhi	*MoU/Signed/Higher Agricultural Education*	

The following linkages were developed for sharing knowledge, technology and research and education capabilities. The partnership between the institution has always been fruitful and in favour of academic growth of partner institution. The partnership with the following institutions is providing theoretical insights, practical experiences and getting concrete suggestions for the improvement of teaching, research and outreach.

2. Achievements made through CAAST under NAHEP

2.1. Output-outcome monitoring

Sub Component: Seed Production of Field Crops

S. N.	Particulars	Apr'2018 to Dec'2023	
		Target	Achievement
1.	% increase in number of technologies commercialized	-	-
2.	% increase in faculty research effectiveness	-	-
3.	Number of direct beneficiaries of the project	-	4702
4.	Number of female beneficiaries	-	1081
5.	% increase in JRF / SRF / ARS	-	25
6.	% increase in number of students who were admitted in foreign universities	-	-
7.	% increase in PG student placements	100	80
8.	Number of industry- sponsored projects and positions in cutting-edge areas of agri-science	-	-
9.	Number of faculty training programmes (national) undertaken by AU	18	18
10.	Number of faculty training programmes (international) undertaken by AU	01	01
11.	Number of student training programmes (national) undertaken by AU	28	28
12.	Number of student training programmes (international) undertaken by AU	01	01

Sub Component: Harvest plus Value addition and Bio-fortification.

S. N.	Particulars	Apr'2018 to Dec'2023	
		Target	Achievement
13.	% increase in number of technologies commercialized	03	Nil
14.	% increase in faculty research effectiveness	50	25
15.	Number of direct beneficiaries of the project	672	1327
16.	Number of female beneficiaries		383
17.	% increase in JRF / SRF / ARS	5	5
18.	% increase in number of students who were admitted in foreign universities	2	Nil
19.	% increase in PG student placements	5	5
20.	Number of industry- sponsored projects and positions in cutting-edge areas of agri-science	-	-
21.	Number of faculty training programmes (national) undertaken by AU	1128	125
22.	Number of faculty training programmes (international) undertaken by AU	-	-

S. N.	Particulars	Apr'2018 to Dec'2023	
		Target	Achievement
23.	Number of student training programmes (national) undertaken by AU	494	494
24.	Number of student training programmes (international) undertaken by AU	-	-

Sub Component: Protected/Off season cultivation of Vegetables- Nil

S. N.	Particulars	Apr'2018 to Mar'2022	
		Plan	Achievement
25.	% increase in number of technologies commercialized	-	-
26.	% increase in faculty research effectiveness	-	-
27.	Number of direct beneficiaries of the project	-	-
28.	Number of female beneficiaries	-	-
29.	% increase in JRF / SRF / ARS	-	-
30.	% increase in number of students who were admitted in foreign universities	-	-
31.	% increase in PG student placements	-	-
32.	Number of industry- sponsored projects and positions in cutting-edge areas of agri-science	-	-
33.	Number of faculty training programmes (national) undertaken by AU	-	-
34.	Number of faculty training programmes (international) undertaken by AU	-	-
35.	Number of student training programmes (national) undertaken by AU	16	16
36.	Number of student training programmes (international) undertaken by AU	-	-
<<Please provide the explanation on the progress made against the output-outcome monitoring indicator and highlight the key initiatives which attributed to the overall outcome/potential impact of the project-Maximum 2-3 paragraphs>>			

Sub Component: Seed Production of Field Crops

2.2. Knowledge Management Collaterals

I. Knowledge Collaterals	Apr'2018 to Dec'2023
1. Publications	07
2. Research Articles	01
3. Annual Reports	23
4. Books	10
5. Success Stories	03
6. Newsletter	21
7. Magazines	

8. Blogs	
<Please provide the details of the Knowledge Management Collaterals with detailed list of authors, title, publication period, URL links etc., in Annexure>	

II. Mobile and Web Applications	**Apr'2018 to Dec'2023**
1. Mobile Applications Developed	01
2. Web Applications Developed	-
<Please provide the details of the applications (along with URL links) with List of documents, authors, publication period in Annexure>	

III. Number of IPR (Intellectual Property Rights) Registered/Obtained	**Apr'2018 to Dec'2023**
1. Copyrights	-
2. Patents	-
3. Others	
<Please provide the details of the Knowledge Management Collaterals with List of documents, authors, publication period in Annexure>	

IV. Dissemination and Outreach	**Apr'2018 to Dec'2023**
1. No. of Posts on Social Media	25
2. No. of Posts on Newspaper	20
3. No. of Posts on Magazines	
4. No. of Unique Promotional or Outreach Collaterals	
<Please provide the details of the Knowledge Management Collaterals with List of documents, authors, publication period in Annexure>	

Sub Component: Harvest plus Value addition and Bio-fortification.

Knowledge Management Collaterals

I. Knowledge Collaterals	**Apr'2018 to Mar'2022**
9. Publications	05
10. Research Articles	
11. Annual Reports	
12. Books	
13. Success Stories	
14. Newsletter	
15. Magazines	
16. Blogs	
Paper/Abstract/Book chapter/Review Article	

Review article on 'Effects of ultra-violet lights on keeping quality and shelf-life of perishable vegetables' Vol-9: 664-666, Online ISSN:2454
Review article on 'Role of Nutritional Ergogenic Foods for performance and recovery of Athletes' (Under Process)
Manual of Food Analysis
Research paper on 'Enhancing Nutritional Quality of Biscuits Through Formulation of Jamun seed powder' (under process)
Research paper on 'Development of Mango-Aonla-Ginger based RTS Beverages'

II. Mobile and Web Applications	Apr'2018 to Mar'2022
3. Mobile Applications Developed	
4. Web Applications Developed	

III. Number of IPR (Intellectual Property Rights) Registered/Obtained	Apr'2018 to Mar'2022
4. Copyrights	
5. Patents	
6. Others	

IV. Dissemination and Outreach	Apr'2018 to Mar'2022
5. No. of Posts on Social Media	
6. No. of Posts on Newspaper	10
7. No. of Posts on Magazines	01
8. No. of Unique Promotional or Outreach Collaterals	

I. Knowledge Collaterals	Apr'2018 to Dec'2023
17. Publications	10
18. Research Articles	02
19. Annual Reports	03
20. Books	-
21. Success Stories	01
22. Newsletter	-
23. Magazines	-
24. Blogs	-
<Please provide the details of the Knowledge Management Collaterals with detailed list of authors, title, publication period, URL links etc., in Annexure>	

II. Mobile and Web Applications	Apr'2018 to Dec'2023

	5. Mobile Applications Developed	-
	6. Web Applications Developed	-
<Please provide the details of the applications (along with URL links) with List of documents, authors, publication period in Annexure>		

III. Number of IPR (Intellectual Property Rights) Registered/Obtained	**Apr'2018 to Dec'2023**
7. Copyrights	
8. Patents	
9. Others	
<Please provide the details of the Knowledge Management Collaterals with List of documents, authors, publication period in Annexure>	

IV. Dissemination and Outreach	**Apr'2018 to Dec'2023**
9. No. of Posts on Social Media	
10. No. of Posts on Newspaper	
11. No. of Posts on Magazines	
12. No. of Unique Promotional or Outreach Collaterals	
<Please provide the details of the Knowledge Management Collaterals with List of documents, authors, publication period in Annexure>	

Sub Component: Protected/Off season cultivation of Vegetables

I. Knowledge Collaterals	**Apr'2018 to Mar'2022**
25. Publications	
a. Full length Research Paper	23
b. Extended summary	04
c. Book Chapters	09
d. Abstracts	24
26. Research Articles	19
27. Annual Reports	03
28. Books	05
29. Success Stories	01
30. Newsletter	-
31. Magazines	-
32. Blogs	-

II. Mobile and Web Applications	Apr'2018 to Mar'2022
7. Mobile Applications Developed	-
8. Web Applications Developed	-

III. Number of IPR (Intellectual Property Rights) Registered/Obtained	Apr'2018 to Mar'2022
10. Copyrights	-
11. Patents	-
12. Others	-

IV. Dissemination and Outreach	Apr'2018 to Mar'2022
13. No. of Posts on Social Media	-
14. No. of Posts on Newspaper	15
15. No. of Posts on Magazines	-
16. No. of Unique Promotional or Outreach Collaterals	-

2.3. Capacity building programs to improve the research effectiveness

Sub Component: Seed Production of Field Crops

Sub Component: Harvest plus Value addition and Bio-fortification.

Total Number of Capacity Building/Components Harvest plus value addition & Biofortification

S. No.	Name of Training	Total Participants	Students Male			Students Female			Faculties Male			Faculties Female		
			Gen	OBC	SC	Gen	OBC	SC	Gen	OBC	SC	Gen	OBC	SC
1	Enterprises development using value addition of vegetables, Sep 20-21, 2019	31	3	3	4	5	4	5	3	2	0	1	0	1
2	Enforcement of food safety in Indian food industries, Dec, 10, 2019	71	18	19	10	6	9	3	2	1	1	1	0	1
3	National training on Recent trends on value addition of vegetables, 5-6 March,2019	54	14	11	4	9	5	3	2	1	2	1	1	1
4	Advanced techniques of food processing and preservation, NIFTEM, Sonepat, Jan 27-Feb 01, 2020	20	3	2	1	5	3	2	0	0	1	2	0	1
5	Emerging technology of food preservation and safety, March 13, 2020.	28	4	2	2	8	6	3	1	0	0	1	0	1
6	E-Training on Nutritional Security and Health through Value Addition of Vegetables and Pulses, 6-10 July, 2020	186	29	19	15	17	18	23	6	3	2	27	16	11
7	National webinar on changing the future with communication skills, June 16, 2020.	265	75	50	41	42	22	15	2	3	1	7	4	3
	Total	655	146	106	77	92	67	54	16	10	7	40	21	19

1. International trainings for students and faculties

Subject areas	*Host institutes, period of training*	*Output of the training*
Students		

Faculty		
<Please provide the list of beneficiaries along with training details in Annexure>		

2. National trainings for students and faculties

Subject areas	*Period of training, total beneficiaries*	*Output of the training*
Students		
	Brain-storming Session on "Bio-fortification Towards Food Security-2019" February 21, 2019 Total beneficiaries: 87	The training had given the knowledge detail about the processing technology of pulse crop explaining the techniques to double the income of farmers. He also highlighted the process of making various food items from by-products of pulses milling
	Advance technology of food processing (16-17) March,2019 Total beneficiaries: 39	This training had very useful for farmers which definitely increase their income and know about the technologies.
	Recent Advances in Functional and Nutraceuticals for Future Foods 8-28 July, 2019 Total beneficiaries: 12	*Twenty one days training program conducted in the university experienced meritorious and renowned scientist came from the different Institute of India as Deputy Director NIN, Hyderabad, NIFTEM, Sonepat Haryana and CFTRI, Mysore,* Dr. S Thiruchenduran from Sri Lanka made presentation on nanotechnology in functional foods fish oil nano-lamination. Dr. Sreenlvasa RJ made presentation on composition of GLV, vegetable and fruits help to eradicate micronutrient deficiencies.
	Recent technologies of food packaging 13 -17 Sep, 2020 Total Beneficiaries:84	The training had given innovative technologies of packaging. 122 participants (M.Sc, Ph. D &faculty) participated in this training, participants belong other universities of India and International such as MAHE, Dubai, Tamilnadu University, Coimbatore Lady Irwin collage, Delhi university, JNU university Delhi, Shere Kashmir University Kashmir,
	National level Awareness Program on Entrepreneurship Development in Agriculture and allied Sectors -2021 Jointly organized by Government of India Ministry of MSME MSME Development Institute, Kanpur &Department of Food Science & Nutrition CAAST-NC One Day 23 Nov,2021 Total Beneficiaries:70	The Training programme were Mr. V.K Verma, (Joint Director) MSME Kanpur and Mr. S.K Pandey (Assistant Director) MSME, Kanpur and Dr. Mohmad Saquib (Food Safety Officer), FSSAI Kanpur. He describe about the role of MSME in food processing industry , and explained about the licensing & registration process of food products. He discussed rules and regulation about the food products .M.Sc, Ph.D & faculty participated in this training, participants belong different universities of India
	An Awareness Program on Digital Library for strengthening Agriculture	Training had given the information about digital library, plagiarism.

	Knowledge In NARES One Day 26 Nov,2021 Total Beneficiaries:100	
	one day Webinar on Food Quality & Policy :Their Implementation In Public Distribution System one day 28th July 2021 Total Beneficiaries:40	Training had given the information about detection of food quality and their distribution system.
	National Conference on Moringa Food Conclave -2021 28th -29th September,202 Total Beneficiaries:70	Moringa conclave had given the information about Moringa products, production technologies.
Faculty		
	Recent Advances in Functional and Nutraceuticals for Future Foods 8-28 July, 2019 Total beneficiaries: 18	*Twenty one days training program conducted in the university experienced meritorious and renowned scientist came from the different Institute of India as Deputy Director NIN, Hyderabad, NIFTEM, Sonepat Haryana and CFTRI, Mysore,* Dr. S Thiruchenduran from Sri Lanka made presentation on nanotechnology in functional foods fish oil nano-lamination. Dr. Sreenlvasa RJ made presentation on composition of GLV, vegetable and fruits help to eradicate micronutrient deficiencies.
	Recent technologies of food packaging 13 -17 Sep, 2020 Total Beneficiaries:38	The training had given innovative technologies of packaging. 122 participants (M.Sc, Ph. D &faculty) participated in this training, participants belong other universities of India and International such as MAHE, Dubai, Tamilnadu University, Coimbatore Lady Irwin collage, Delhi university, JNU university Delhi, Shere Kashmir University Kashmir,
	National level Awareness Program on Entrepreneurship Development in Agriculture and allied Sectors -2021 Jointly organized by Government of India Ministry of MSME MSME Development Institute, Kanpur &Department of Food Science & Nutrition CAAST-NC One Day 23 Nov,2021 Total Beneficiaries:22	The Training programme were Mr. V.K Verma, (Joint Director) MSME Kanpur and Mr. S.K Pandey (Assistant Director) MSME, Kanpur and Dr. Mohmad Saquib (Food Safety Officer), FSSAI Kanpur. He describe about the role of MSME in food processing industry , and explained about the licensing & registration process of food products. He discussed rules and regulation about the food products .M.Sc, Ph.D & faculty participated in this training, participants belong different universities of India
	An Awareness Program on Digital Library for strengthening Agriculture Knowledge In NARES One Day 26 Nov,2021Total Beneficiaries:50	Training had given the information about digital library, plagiarism.
	one day Webinar on Food Quality & Policy :Their Implementation In Public Distribution System one day 28th July 2021 Total Beneficiaries:12	Training had given the information about detection of food quality and their distribution system.
	National Conference on Moringa Food Conclave -2021 28th -29th September,202 Total Beneficiaries:30	Moringa conclave had given the information about Moringa products, production technologies.
<Please provide the list of trainings in Annexure>		

Sub Component: Protected/Off season cultivation of Vegetables –

B. CAPACITY BUILDING OF STUDENTS

During the reporting period brain storming, student mentoring programme, national training, short course, exposure visit were organized as details given below-

S. No.	Activity	Course Name	Duration	Date	Venue
1.	National Training	Recent Advances in Protected Cultivation of Vegetables	02 days	Feb 20-21, 2019	CSAUAT, Kanpur
2.	Brain Storming	Advances in Organic Farming of Vegetables under Protected Conditions	01 day	February 25, 2019	CSAUAT, Kanpur
3.	Short Course	Protected cultivation of vegetable crops	07 days	March 12- 18, 2019	CSAUAT, Kanpur
4.	Students' Mentoring Programme	On Nutritional Crops	01 day	March 30, 2019	CSAUAT, Kanpur
5.	Brain Storming	Enhancing Nutritional and Economic value of Agri-produce	01 day	Aug. 16, 2019	CSAUAT, Kanpur
6.	Brain Storming	Organic Cultivation of Vegetable Crops under Protected Conditions	01 day	Sept. 24, 2019	CSAUAT, Kanpur
7.	Students' Mentoring Programme		01 day	Oct. 05, 2019	CSAUAT, Kanpur
8.	Students' Mentoring Programme		01 day	Oct. 19, 2019	CSAUAT, Kanpur
9.	Brain storming	Hi- Tech Nursery Raising Technology for Vegetables	01 day	Nov. 26, 2019	CSAUAT, Kanpur
10.	Brain storming	Recent Advances in Protected Cultivation of Vegetable Crop	01 day	Nov. 27, 2019	CSAUAT, Kanpur
11.	National Training On	Recent Advances in Nutrient management in Vegetables under Protected Cultivation	02 days	Nov. 29-30, 2019	CSAUAT, Kanpur
12.	Short Course	Seed Production and Processing of Vegetable Crops	07 days	Dec. 21-27, 2019	CSAUAT, Kanpur
13.	Training cum Exposure Visit	Molecular Breeding in Vegetable Crops	15 days	Jan. 16-30, 2020	ICAR-IIVR, Varanasi
14.	Training cum Exposure Visit	"Agronomic Interventions for Enhancing Nutrient Use Efficiency and Nutritional Quality in Pulse and	14 days	Feb. 10-23, 2020	ICAR-IARI, New Delhi

		Vegetable Crops"			
15.	Training cum Exposure Visit	Pre breeding and molecular approach- Two important pillars for vegetable and crop improvement	14 days	Feb. 17 – Mar. 01, 2020	ICAR-IARI, New Delhi

2.4. Input and activity monitoring

Sub Component: Seed Production of Field Crops

	Capital	Revenue
Total funds received during 2018-2022 by PIU (INR Lakhs)	562.34	1267.70
Total funds received till 2018-2022(Cumulative) (INR Lakhs)	562.34	1267.70
Total expenditure during the year 2018-2022(INR Lakhs)	611.57	740.87
Total expenditure till 2018-2022(Cumulative) (INR Lakhs)		

Input / Activity indicator	Sub- head / category	Apr'2018 to Dec'2023 Expenditure / input in INR lakhs Utilization	Planned	Activity elaboration
Goods and equipment	Equipment, Plant & Machinery	**302.99**	**236.08**	
	Office equipment	**8.80**	**8.24**	
	Laboratory equipment	**175.17**	**268.08**	
	Furniture & fixtures	**8.83**	**14.48**	
	Computers and Peripherals	**27.35**	**18.95**	
	Books and Journals	**16.47**	**16.51**	
Civil works	Minor repair and renovation work	**71.96**	**86.53**	
Human capacity building	National level training	**0.00**	**28.85**	
	International level training	**0.00**	**85.65**	
	Short visit/ seminars	**0.24**	**12.36**	
	Meetings and workshops	**5.76**	**7.66**	
Consultancy	National level consultancies	**0.00**	**33.84**	
Recurrent cost / Miscellaneous	Travel	**8.27**	**11.36**	
	Contractual services	**226.97**	**238.61**	
	Operational costs	**439.40**	**701.82**	
	Institutional charges	**60.23**	**60.98**	
Total		**1352.44**	**1830.00**	

Sub Component: Harvest plus Value addition and Bio-fortification.

Total funds received during 2018-2022 by PIU (INR Lakhs)	1830.00
Total funds received till 2018-2022(Cumulative) (INR Lakhs)	1830.00
Total expenditure during the year 2018-2022(INR Lakhs)	1352.00
Total expenditure till 2018-2022(Cumulative) (INR Lakhs)	1352.00

Input / Activity indicator	Sub- head / category	Apr'2018 to Mar'2022 Expenditure / input in INR lakhs Utilization	Planned	Activity elaboration
Goods and equipment	Equipment, Plant & Machinery			
	Office equipment			
	Laboratory equipment			
	Furniture & fixtures			
	Computers and Peripherals			
	Books and Journals			
Civil works	Minor repair and renovation work			
Human capacity building	National level training	**5,61,109**		**07 training programmes**
	International level training			
	Short visit/ seminars			
	Meetings and workshops			
Consultancy	National level consultancies			
Recurrent cost / Miscellaneous	Travel			
	Contractual services			
	Operational costs			
	Institutional charges			

Sub Component: Protected/Off season cultivation of Vegetables

Total funds received during 2018-2022 by PIU (INR Lakhs)	5613206+1475580+497290+775937=8362013.0
Total funds received till 2018-2022(Cumulative) (INR Lakhs)	8362013.00
Total expenditure during the year 2018-2022(INR Lakhs)	8362013.00
Total expenditure till 2018-2022(Cumulative) (INR Lakhs)	8362013.00

Input / Activity indicator	Sub- head / category	Apr'2018 to Mar'2022 Expenditure / input in INR lakhs Utilization	Planned	Activity elaboration
Goods and equipment	Equipment, Plant & Machinery	5269100.00	5269100.00	Solar power plant and Drip irrigation system well established and active.
	Office equipment			
	Laboratory equipment			
	Furniture & fixtures			
	Computers and Peripherals			

Input / Activity indicator	Sub- head / category	Apr'2018 to Mar'2022 Expenditure / input in INR lakhs		Activity elaboration
		Utilization	Planned	
	Books and Journals			
Civil works	Minor repair and renovation work			
Human capacity building	National level training	3881312.00	3881312.00	
	International level training			
	Short visit/ seminars			
	Meetings and workshops			
Consultancy	National level consultancies			
Recurrent cost / Miscellaneous	Travel			
	Contractual services			
	Operational costs			
	Institutional charges			
Total				
Observation				
<<Please provide the explanation on the progress made against the input and activity monitoring parameters>>				

2.5. NAHEP outreach and other unique initiatives undertaken

Please provide the brief progress undertaken against the different categories placed below along with the suitable photographs/links/documents etc. Please note that only significant activities/initiatives are to be incorporated in this document.

a) **Case studies/success stories developed under NAHEP**
(establishment of own enterprise by beneficiary student/high-impact research carried-out by AU under NAHEP/enhanced students learning outcomes due to establishment of modern facilities under NAHEP etc.)

Illustrative: Success story

Sub Component: Seed Production of Field Crops

The training/ mentoring/ brainstorming/ exposure visit of the students has increased their technical skills like writing of thesis, access of high impacted journal, report writing, publication of research articles: soft skills like, communication skills, interpersonal relationship, managing stress and entrepreneurial skills for quality seed production. 06 students of Seed Science& Technology have qualified ASRB-NET examination and 04 had qualified ASRB ARS Pre examination during the period. 8 students got selected in various Ph.D entrance examinations.

Sub Component: Harvest plus Value addition and Bio-fortification.

A success story of value added products of protein rich biscuits, multigrain dalia and multigrain atta. The fortified products have developed under the component of Harvest plus

value addition & bio-fortification. The cowpea and moog bean fortified biscuits have good nutritive value with high acceptability. It took 7 trials to manage taste and appearance, the main challenge to get to right products with no compromise the nutritive value Protein, iron and calcium rich value added products for malnourished people and children. These products have lactose free, easily digestible and low cost for human being.

Sub Component: Protected/Off season cultivation of Vegetables

Consumption of fresh vegetables could be a major part of healthy diet due to cheap availability of larger amount of nutritional compounds. But, to meet national demand of vegetables under changing agro-climate condition, there is need to focus higher priority on research management of natural resources, including adoption to climate change, conservation of natural resources and efficient use of inputs, particularly soil and water, genetic enhancement to sustainably raise yield limit, enhance biotic and abiotic stresses resistance and improve food quality and nutritional content. This project provides opportunity to catch up these gaps. By this project more farmers get opportunity to access the quality vegetable production and increase the productivity of vegetables in the state through introduction of latest technology by which the income of farmers has increased. Many of farmers purchased high quality seedlings and also get information about hi-tech technology of growing vegetables in kitchen gardening and under protected condition by CAAST employees. The training/ mentoring/ brainstorming/ exposure visit of the students has increased their technical skills like writing of thesis, access of high impacted journal, report writing, publication of research articles: soft skills like, communication skills, interpersonal relationship, managing stress and entrepreneurial skills for quality vegetable production. 12 students of Vegetable Science have qualified ASRB-NET examination during last year. 8 students got selected in various Ph.D entrance examinations. Dr. Meenakshi Kumari got best Poster Presentation Award (2019) in the "International Conference on (SUGARCON-2019) on Green Technologies for Sustainable Development of Sugar & Integrated Industries" at ICAR- Institute of Sugarcane Research, Lucknow, UP, India, February, 16-19 and also got Best Poster Presentation Award (2019) in the "International Conference on Global Initiatives in Agricultural and Applied Sciences for Eco Friendly Environment (GIASE-2019)" at Tribhuvan University, Kathmandu, Nepal, June, 16-18 June. Dr. Saurabh Tomar got best Ph.D thesis award in the "International Conference on Global Initiatives in Agricultural and Applied Sciences for Eco Friendly Environment (GIASE-2019)" at Tribhuvan University, Kathmandu, Nepal, June, 16-18 June.

b) **Knowledge management and outreach initiatives (development of collaterals, newsletter, social media outreach activities, creation of website, experiential learning workshop, exposure visits** (provide the details of the documents/articles/reports/modules/social media outreach/ website creation/experiential learning workshop/exposure visits etc. developed under NAHEP along with the suitable photograph of the cover-page and web-link (if available) – brief summary, cover page,

Sub Component: Seed Production of Field Crops

S. No.	Activity	Course Name	Duration	Date	Venue
1.	National Training	Advances in Seed Production & Seed Quality Management of Nutritional Crops	02 Days	Feb 18-19, 2019	CSAUAT, Kanpur
2.	National Training	Innovations in Seed Production & Seed Quality Management	02 Days	March 09-10, 2019	CSAUAT, Kanpur

		of Nutritional crops			
3.	Training cum Exposure Visit	Visit to National Seed Research & Training Centre (NSRTC) & Indian Institute of Vegetable Research (IIVR), Varanasi.	02 Days	March 17- 19, 2019	Centre (NSRTC) & Indian Institute of Vegetable Research (IIVR), Varanasi.
4.	Students' Mentoring Programme	Student's Mentoring Programme on Nutritional crops	01 Day	March 29, 2019	CSAUAT, Kanpur
5.	Training cum -Exposure Visit		11 Days	June 30- July 10, 2019	11 ICAR & AU
6.	National Training	Technological Interventions for Quality Seed production of Nutritional crops	02 Days	Oct, 23-24, 2019	CSAUAT, Kanpur
7.	Mentoring Programme	Personality and Communication Skill Development of PG Students	01 Day	January, 20, 2020	CSAUAT, Kanpur
8.	Brain Storming Session	Entrepreneurship Development for Quality Seed Production of Nutritional Crops	01 Day	January, 23, 2020	CSAUAT, Kanpur
9.	National Training	Innovation in Seed production and Seed Processing Technology of Nutritional Crops	02 Days	January, 24-25, 2020	CSAUAT, Kanpur
10.	Awareness/Training Programme	Development of Soft Skills for Entrepreneurship among Agri-graduates	01 Day	Feb, 15, 2020	CSAUAT, Kanpur
11.	National Training	Principles of Seed Production, Processing and Quality Assurance	15 Days	Feb, 24-March 09, 2020	ICAR-IISS, Mau.
12.	Short Course	Application of Modern Technology In Seed Production, Seed Processing and Seed Quality Enhancement of Nutritional Crops	08 Days	March, 13-19, 2020	CSAUAT, Kanpur

13.	National Training	Genome editing & marker–Assistant selection for precision plant breeding	01 Day	May 30, 2020	CSAUAT, Kanpur
14.	National Webinar	Recent technological interventions for seed production and seed quality enhancement on nutritional crops	01 Days	22-23 June, 2020	CSAUAT, Kanpur
15.	National e-Training	Scaling up of Knowledge Domain and Entrepreneurial Skill Development of Post Graduate Students and budding scientists for Quality Seed Production and Seed Quality Enhancement"	05 Days	25.08.2020 to 29.08 2020	CSAUAT, Kanpur
16.	e-Brainstorming Session	Communication Skills Development for Seed Entrepreneurship	02 Days	25.09.2020 to 26.09.2020	CSAUAT, Kanpur
17.	National e-Training	Research Ethics and Thesis/Research Paper Writing Skills Development	05 Days	Nov, 24-28, 2020	CSAUAT, Kanpur
18.	National Webinar	Farmer Producer Organization: Need Opportunity, Challenges and Execution	01 Day	23.12.2020	CSAUAT, Kanpur
19.	Online Quiz Competition	Quest For the Best	01 Day	28.01.2021	CSAUAT, Kanpur
20.	Online Essay Competition	Innovations in Quality seed Chain management	01 Day	30.01.2021	CSAUAT, Kanpur
21.	Online Persuasive Writing Competition	Role of Quality Seed in Doubling Farmers' Income	01 Day	03.02.2021	CSAUAT, Kanpur
22.	National Virtual Training	Novel Approaches for Quality Seed Production of Nutritional Crops	08 Days	12-19 Aug, 2021	CSAUAT, Kanpur

23.	Online Training	Student Development Programme	15 Days	15-29, September, 2021	CSAUAT, Kanpur
24.	e-Lecture	Intellectual Property Right in Agriculture Research and Education Towards a Mature Innovation System in Atmanirbhar Bharat"	01 Day	November, 22, 2021	CSAUAT, Kanpur
25.	e-Lecture	Regulatory Framework for Sustainable Quality seed Production and Seed Supply Chain management"	01 Day	November, 25, 2021	CSAUAT, Kanpur
26.	Students' Mentoring	Mentoring for Their Holistic Development	01 Day	27 November, 2021	CSAUAT, Kanpur
27.	e-Lecture	Application of Nanotechnology in Agriculture	01 Day	December, 22, 2021	CSAUAT, Kanpur
28.	Scientist - Farmers' Interaction and Training	Quality Seed Production and Value Addition of Rabi Field Crops and Vegetables	01 Day	January, 09, 2022	CSAUAT, Kanpur

1. National Training on Advances in Seed Production & Seed Quality Management of Nutritional Crops (Feb 18-19, 2019)




2. National Training on Innovations in Seed Production & Seed Quality Management of Nutritional crops (March 09-10, 2019)




3. Training cum Exposure Visitto National Seed Research & Training Centre (NSRTC) & Indian Institute of Vegetable Research (IIVR), Varanasi. (March 17- 19, 2019)





Student's Mentoring Programme on Nutritional crops. (March 29, 2019)

Training cum -Exposure Visit (June 30- July 10, 2019)

4. National Training on Technological Interventions for Quality Seed production of Nutritional crops (Oct, 23-24, 2019)

5. Mentoring Programme on Personality and Communication Skill Development of PG Students (January, 20, 2020)




6. Brain Storming Session on Entrepreneurship Development for Quality Seed Production of Nutritional Crops (January, 23, 2020)



7. National Training on Innovation in Seed production and Seed Processing Technology of Nutritional Crops (January, 24-25, 2020)

8. Awareness/Training Programme on Development of Soft Skills for Entrepreneurship among Agri-graduates (Feb, 15, 2020)

9. National Training on Principles of Seed Production, Processing and Quality Assurance (Feb, 24-March 09, 2020)

10. Short Course on Application of Modern Technology In Seed Production, Seed Processing and Seed Quality Enhancement of Nutritional Crops (March, 13-19, 2020)

11. National Training on Genome editing & marker–Assistant selection for precision plant breeding (May 30, 2020)

12. **Students' Mentoring for Their Holistic Development (27 November, 2021)**

13. Scientist -Farmers' Interaction and Training on Quality Seed Production and Value Addition of Rabi Field Crops and Vegetables (January, 09, 2022)

Sub Component: Protected/Off season cultivation of Vegetables

S. No.	Activity	Course Name	Duration	Date	Venue
1.	National Training	Recent Advances in Protected Cultivation of Vegetables	02 days	Feb 20-21, 2019	CSAUAT, Kanpur
2.	Brain Storming	Advances in Organic Farming of Vegetables under Protected Conditions	01 day	February 25, 2019	CSAUAT, Kanpur

3.	Short Course	Protected cultivation of vegetable crops	07 days	March 12- 18, 2019	CSAUAT, Kanpur
4.	Students' Mentoring Programme	On Nutritional Crops	01 day	March 30, 2019	CSAUAT, Kanpur
5.	Brain Storming	Enhancing Nutritional and Economic value of Agri-produce	01 day	Aug. 16, 2019	CSAUAT, Kanpur
6.	Brain Storming	Organic Cultivation of Vegetable Crops under Protected Conditions	01 day	Sept. 24, 2019	CSAUAT, Kanpur
7.	Students' Mentoring Programme		01 day	Oct. 05, 2019	CSAUAT, Kanpur
8.	Students' Mentoring Programme		01 day	Oct. 19, 2019	CSAUAT, Kanpur
9.	Brain storming	Hi- Tech Nursery Raising Technology for Vegetables	01 day	Nov. 26, 2019	CSAUAT, Kanpur
10.	Brain storming	Recent Advances in Protected Cultivation of Vegetable Crop	01 day	Nov. 27, 2019	CSAUAT, Kanpur
11.	National Training On	Recent Advances in Nutrient management in Vegetables under Protected Cultivation	02 days	Nov. 29-30, 2019	CSAUAT, Kanpur
12.	Short Course	Seed Production and Processing of Vegetable Crops	07 days	Dec. 21-27, 2019	CSAUAT, Kanpur
13.	Training cum Exposure Visit	Molecular Breeding in Vegetable Crops	15 days	Jan. 16-30, 2020	ICAR-IIVR, Varanasi
14.	Training cum Exposure Visit	Agronomic Interventions for Enhancing Nutrient Use Efficiency and Nutritional Quality in Pulse and Vegetable Crops	14 days	Feb. 10-23, 2020	ICAR-IARI, New Delhi
15.	Training cum Exposure Visit	Pre breeding and molecular approach- Two important pillars for vegetable and crop improvement	14 days	Feb. 17 – Mar. 01, 2020	ICAR-IARI, New Delhi
16.	National virtual Training	Quality Seed Production of Vegetable Crops under Protected Cultivation	05 days	August 24-28, 2020	CSAUAT, Kanpur
17.	National Webinar	Protected cultivation of vegetable crops: challenges and opportunities	01 day	June 23, 2020	CSAUAT, Kanpur
18.	Online National Training	Employment Generation Through Organic Cultivation of Vegetables Under Protected Conditions	02 days	June 21-22, 2021	CSAUAT, Kanpur
19.	Online National Training on	Developing Entrepreneurship in Vegetables through Protected Cultivation	02 days	July 06-07, 2021	CSAUAT, Kanpur
20.	Students'	Protected Cultivation of	01 day	November 19, 2021	CSAUAT,

	Mentoring Programme	Vegetables: Challenges & Opportunities			Kanpur

1. National Training on Recent Advances in Protected Cultivation of Vegetables (Feb 20-21, 2019)

2. Brain storming on Advances in Organic Farming of Vegetables under Protected Conditions (February 25, 2019)

3. Short course on protected cultivation of Vegetable crops (March 12- 18, 2019):

4. Students' Mentoring Programme on Nutritional Crops (March 30, 2019)

5. Brain Storming On Enhancing Nutritional and Economic value of Agri- produce (16th August, 2019)

6. Brain Storming On Organic Cultivation of Vegetable Crops under Protected Conditions (24 September, 2019)

7. Students' Mentoring Programme (5 October, 2019)



8. Students' Mentoring Programme (19 October, 2019)

9. Brain storming On Hi- Tech Nursery Raising Technology for Vegetables (26 Nov, 2019).

10. Brain storming on Recent Advances in Protected Cultivation of Vegetable Crop (27 November, 2019).


11. National Training on Recent Advances in Nutrient management in Vegetables under Protected Cultivation (29-30 Nov, 2019).

12. Short Course On Seed Production and Processing of Vegetable Crops (21-27 December, 2019).

13. Training cum Exposure Visit "Molecular Breeding in Vegetable Crops" (January 16-30, 2020)

14. Training cum Exposure Visit "Agronomic Interventions for Enhancing Nutrient Use Efficiency and Nutritional Quality in Pulse and Vegetable Crops" (February 10-23, 2020)

15. Training cum Exposure Visit "Pre breeding and molecular approach- Two important pillars for vegetable and crop improvement" at ICAR-IARI, New Delhi (during February 17 - March 01, 2020)

Fig.1: Inaugural day training program: Chief guest Dr. R. C. Agrawal, Honorable DDG (Education) ICAR and inaugural lecture by Prof. N. K. Singh, National Professor and Director NIPB, Delhi

c) **Unique initiatives undertaken**

1. Digital infrastructure

(development of digital/smart classroom, virtual reality facility, digital library system, other digital education and administrative infrastructure, Agri Diksha, AMS implementation etc.)

2. Digital initiatives:

(organizing trainings through online, conducting online examinations, administering attendance, developing of web applications, e-learning modules etc.

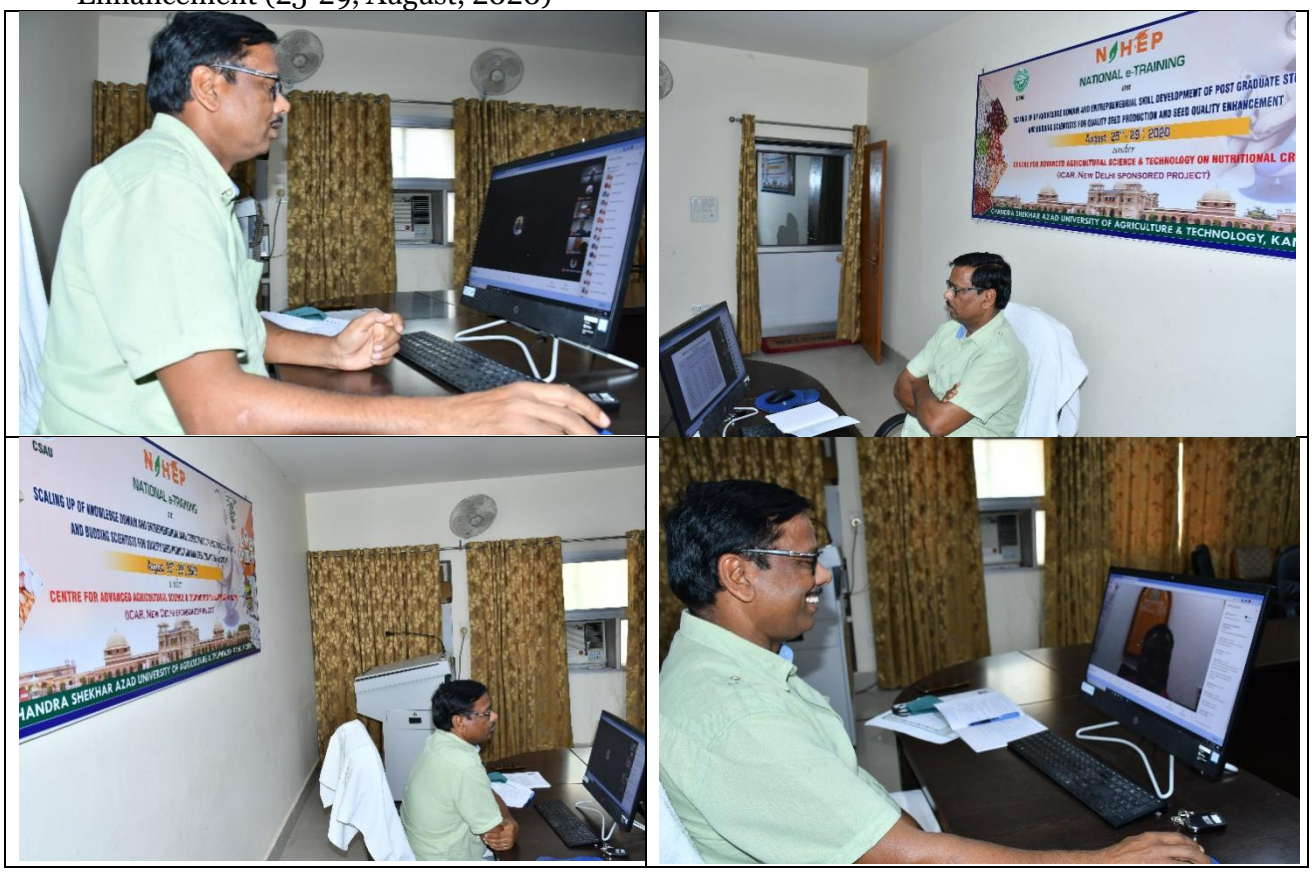
Sub Component: Seed Production of Field Crops

S.N	Category of the collateral	Digital initiative	Practice before introduction of the initiative	Practice after introduction of the initiative
1.	Training	Online	Nil	05 trainings were organized
2.	Webinar	Online	Nil	02 webinar was organized
3.	e-Lecture	Online	Nil	03 e-Lecture was organized
4.	e-Brainstorming	Online	Nil	01 e-Brainstorming was organized
5.	Quiz Competition	Online	Nil	01 Quiz Competition was organized
6.	Essay Competition	Online	Nil	01 Essay Competition was organized
7.	Persuasive writing	Online	Nil	01 Persuasive writing was organized

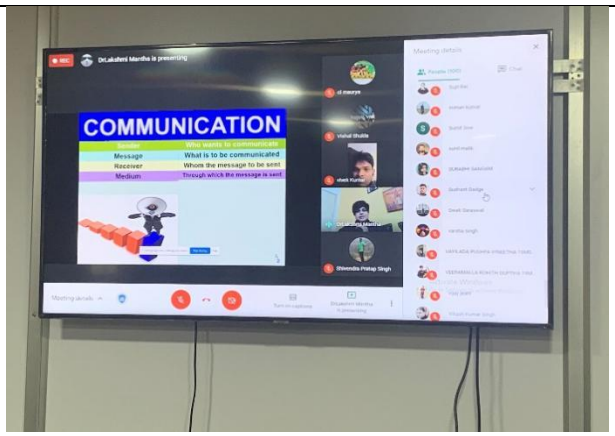
Please provide up to 15 photographs with high quality (minimum 1-2MB) and label with suitable caption. Attach the photographs separately in the mail.

1. National Webinar on Recent technological interventions for seed production and seed quality enhancement on nutritional crops (22-23 June, 2020)

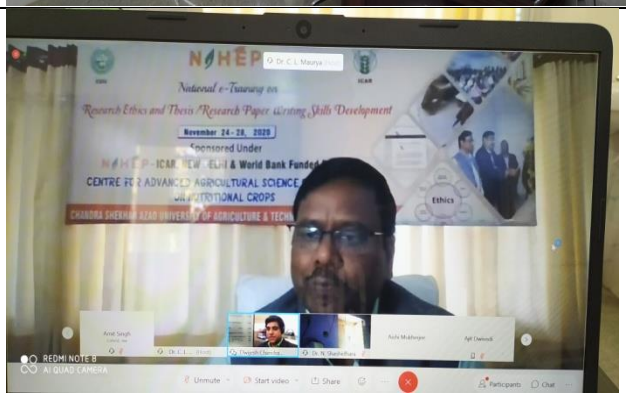
2. National e-Training on Scaling up of Knowledge Domain and Entrepreneurial Skill Development of Post Graduate Students and budding scientists for Quality Seed Production and Seed Quality Enhancement (25-29, August, 2020)



3. e-Brainstorming Session on Communication Skills Development for Seed Entrepreneurship (25-26, September, 2020)



4. National e-Training on Research Ethics and Thesis/Research Paper Writing Skills Development (Nov, 24-28, 2020)



5. National Webinar on Farmer Producer Organization: Need Opportunity, Challenges and Execution (Dec, 12, 2020)

6. Online Quiz Competition on Quest For the Best (January, 28, 2021)

7. Online Essay Competition on Innovations in Quality seed Chain management (January, 30, 2021)

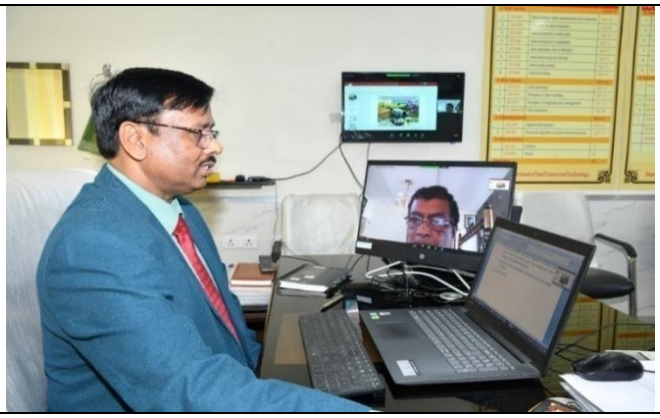
8. Online Persuasive Writing Competition on Role of Quality Seed in Doubling Farmers' Income (February, 03, 2021)

9. National Virtual Training on Novel Approaches for Quality Seed Production of Nutritional Crops (12-19 Aug, 2021)

10. Online Training on Student Development Programme (15-29, September, 2021)

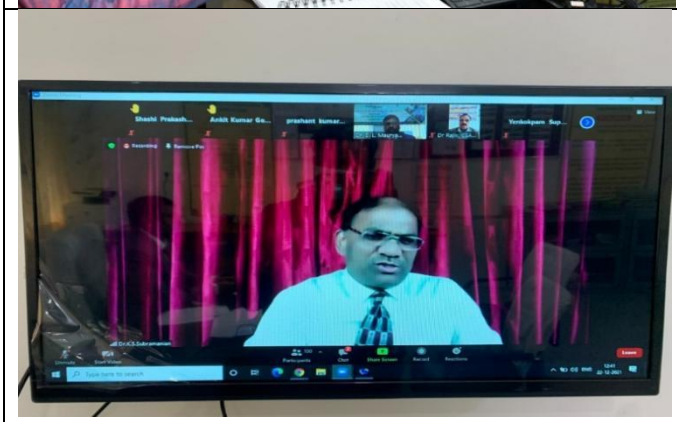
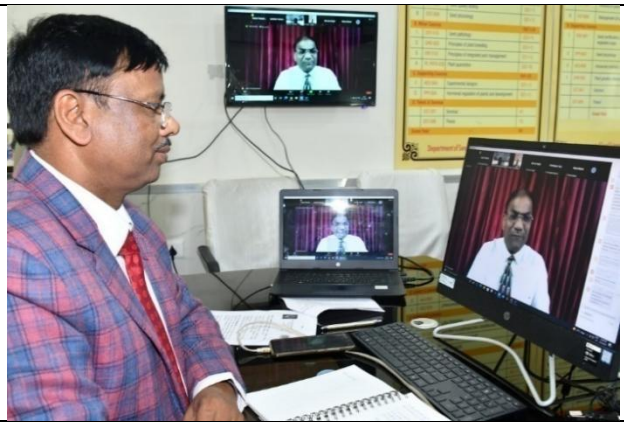
11. e-Lecture on Intellectual Property Right in Agriculture Research and Education Towards a Mature Innovation System in Atmanirbhar Bharat (November, 22, 2021)


12. e-Lecture on Regulatory Framework for Sustainable Quality seed Production and Seed Supply Chain management (November, 25, 2021)

13. e-Lecture on Application of Nanotechnology in Agriculture (December, 22, 2021)

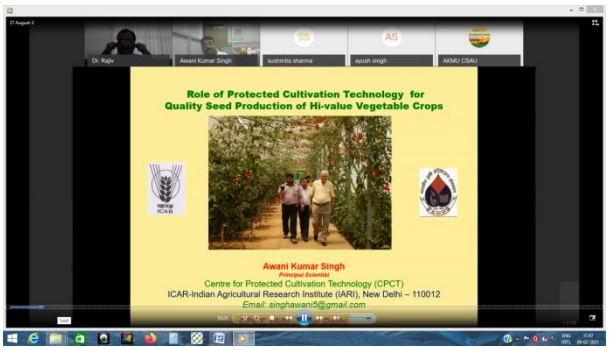


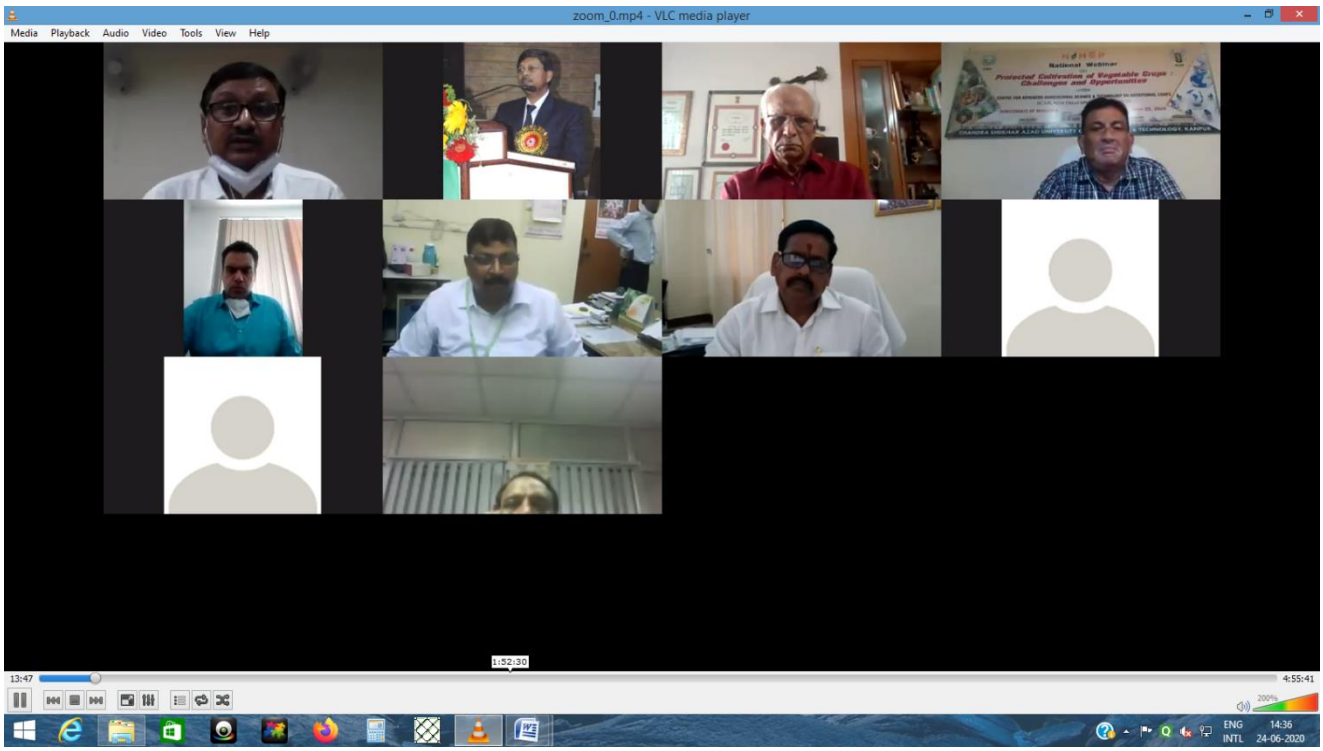
Sub Component: Protected/Off season cultivation of Vegetables

S.N	Category of the collateral	Digital initiative	Practice before introduction of the initiative	Practice after introduction of the initiative
1	Training	Online	Nil	03 trainings were organized
2	Webinar	Online	Nil	01 webinar was organized

Online National Training on Quality Seed Production of Vegetable Crops under Protected Cultivation (24-28 August, 2020)



National Webinar on Protected Cultivation of Vegetable Crops: Challenges and Opportunities (23 June, 2020)



02 Days Online National Training on Developing Entrepreneurship in Vegetables through Protected Cultivation (06-07 July, 2021)

3. Potential impact of the intervention:

Observation

Sub Component: Harvest plus Value addition and Bio-fortification.

To conduct how to organize trainings program and exposure visit with the students which help in capacity building for students and faculty.

These value added & fortified products have effective way to address the micronutrient deficiency.

Sub Component: Harvest plus Value addition and Bio-fortification.

Application of GA_3 and NAA both @ 100 ppm gives highest plant height, number of leaves, number of fruits, fresh fruit weight as well as ascorbic acid, total soluble solid (TSS), individual fruit weight and fruit yield in tomato. Similarly in bitter gourd cv. Kalyanpur Barahmasi produced highest fruit yield and maximum B:C ratio with the application of foliar feeding of mixture of all micronutrients (boric acid 100 ppm + zinc sulphate 100 ppm + ammonium molybdate 50 ppm + cooper sulphate 100 ppm + ferrous sulphate 100 ppm + manganese sulphate 100 ppm).

Sub Component: Harvest plus Value addition and Bio-fortification.

To conduct how to organize trainings program and exposure visit with the students which help in capacity building for students and faculty.

These value added & fortified products have effective way to address the micronutrient deficiency.

Impact of Social Safeguard Activities under taken during the project

Labor Management Plan (LMP)

S. No.	Name of the work	LMP	SMP	IR&H
1.	Renovation of Poly house (03)	✓ No child labour ✓ Portable drinking water facility ✓ Separate GRM ✓ Dust pollution protection	✓ Barricading ✓ Helmet ✓ Poster to inform ✓ Separate toilets for labours	Work completed and the contractor has handed over the site.
2.	Renovation of Laboratory (03)	✓ No child labour ✓ Portable drinking water facility ✓ Separate GRM ✓ Dust pollution protection	✓ Barricading ✓ Helmet ✓ Poster to inform ✓ Separate toilets for labours	Work completed and the contractor has handed over the site.
3.	Renovation of Lecture Hall (03)	✓ No child labour ✓ Portable drinking water facility	✓ Barricading ✓ Helmet ✓ Poster to	Work completed and the contractor has handed over the site.

		✓ Separate GRM ✓ Dust pollution protection	inform ✓ Separate toilets for labours	
4.	Renovation of ICT Laboratory (01)	✓ No child labour ✓ Portable drinking water facility ✓ Separate GRM ✓ Dust pollution protection	✓ Barricading ✓ Helmet ✓ Poster to inform ✓ Separate toilets for labours	Work completed and the contractor has handed over the site.
5.	Renovation of Threshing Floor (03)	✓ No child labour ✓ Portable drinking water facility ✓ Separate GRM ✓ Dust pollution protection	✓ Barricading ✓ Helmet ✓ Poster to inform ✓ Separate toilets for labours	Work completed and the contractor has handed over the site.

Impact of the EAP

1.	Before implementation of the project, on time post-graduation rate of ST, SC & girls students was 70.60 % (2017-18), now it has increase to 81.01% during 2019-20
2.	Average OGPA of girls students was 7.19% before implementation of the project, now it has increase to 7.56% during 2019-20
3.	Average OGPA of ST students was 7.28% beforeimplementation of the project, now it has increase to7.87% during 2019-20
4.	Average OGPA of SC students was 7.45 % beforeimplementation of the project, now it has increase to7.89% during 2019-20
5.	02 students availed the opportunity for internationaladvance training to CIMMYT, it has happened first time in the university .
6.	12 ST (male) & 451 SC (male) students benefited.
7.	615 girls students (97 SC & 518 others) benefited and sensitivity to gender equality.
8.	Enhancement in communication and presentation skillsof the 546 weak students.
9.	Improvement in learning efficiency of socially and economically vulnerable students.
10.	Improvement in confidence levels of the weak students.
11.	Change in human behavior.
12.	Labour safety and security, engaged in civil works.
13	Grievance redress mechanism established.
14.	Mentorship among students and teachers promoted.

Grievance Redressal Mechanism (GRM)

Sl.No	Name of AU/ Collage	NO(GRM) nominated (Y or N)	No of Display Board & Boxes	No of grievances received	Exhilarates to Tier II
1.	CSA University Campus	Y	06	0	0

Social Inclusion in different activities

Sl. No	Activities	No of Program	Participated						Total	Equity*						Total	Discrepancy						Total
			Female			Male				Female			Male				Female			Male			
			ST	SC	Gen	ST	SC	Gen		ST	SC	Gen	ST	SC	Gen		ST	SC	Gen	ST	SC	Gen	
D	Skill Development Programs	2	0	1	5	1	21	86	114	3	5	29	6	12	59	114	-3	-4	-24	-5	+9	+27	0

4. Challenges faced and lessons learned while implementing the project at AU:

Challenges	
1	Due to pandemic COVID-19, during the last year the University Administration has limited the scope and opportunity for working in the interest of the project, which was major problem face by the component.
2	**Problem faced in implementation in technical point of view and how it will be solved** During COVID-19, physical activities were almost nil. We opted virtual mode for connecting our stakeholders. All capacity building activities were conducted online mode.
3	Limited procurement plan was bottleneck of the project due non support of finance division of University. Finally, As suggested by finance division, we opted GeM/ e-tender method for procurement of equipments & apparatus
4	Lack of internet facilities to the students, difficulty to follow up the learning of students are the major challenges faced by them.
Lessons learned	
1	Institution must be strengthened for hybrid mode of teaching learning methods to face the situation like Covid-19 pandemic.
2	The key recommendation suggested by this study is that teachers need to be equipped with the pre-service and in-service awareness training programmes on e-learning technology.
3	Digital platform should be used.

5. Sustainability Plan

5.1. Sustainability plan of the AU

- *Does the AU have any sustainability plan for the interventions undertaken in NAHEP? (Yes / No)?(Yes / No)*
- *If yes, details thereof?*

1	
2	
3	
4	
5	

5.2. Sustainability plan for improving internal revenue generation through facilities and infrastructure created under the project

1	
2	
3	
4	
5	

6. Contribution of each individual in project

6.1. Name of Vice Chancellors(s) during project duration and contributions each PI, Co-PI and team along with their photographs

1. Dr Sushil Soloman
Vice Chancellor, CSAUA&T, Kanpur
from 13.12.2016 to 10.02.2020

2. Dr. D.R. Singh
Vice Chancellor, CSAUA&T, Kanpur
from 11.02.2020 to 15.01.2023

Project Title: Harvest Plus Value Addition & Bio-fortification

Name	Gender	Designation in AU and contact details (email, mobile)	Role in project (PI/Co-PI/RA/SRF etc.)	Major contribution/output
Dr. H.G. Prakash 	Male	Director Research	PI	
Dr C.L. Maurya 	Male	Professor	Co-PI	
Dr. D.P. Singh 	Male	Associate professor	Co-PI	
Dr Rashmi Singh 	Female	Associate professor	Co-PI	
Dr.Seema Sonkar	Female	Associate professor 8853065588 seema07csa@gmail.com, seema07cs@csauk.ac.in	Co-PI	**Training** : We organized one day **Brain storming Session,** two days training on

				**Advance technology of food processing,twenty one days training, Recent Advances in Functional and Nutraceuticals for Future Foods**, **Recent technologies of food packaging** 13 -17 Sep, 2020, National level Awareness Program on Entrepreneurship Development in Agriculture and allied Sectors -2021 Jointly organized by Government of India Ministry of MSME,MSME Development Institute, Kanpur &Department of Food Science & Nutrition CAAST-NC One Day 23 Nov,2021, An Awareness Program on Digital Library for strengthening Agriculture Knowledge In NARES One Day 26 Nov,2021, one day Webinar on Food Quality & Policy :Their Implementation In Public Distribution System one day 28th July 2021, National Conference on Moringa Food Conclave -2021 28th -29th September,2022 **Exposure Visit** RFRAC, Lucknow- 2019 Parle G Industry-2019 National Collateral Management Services Limited (NCML), Kanpur- 20192019 Vedant Edible Product at Auriya, Kanpur Dehat-2019 **Innovative product Development** The development of products viz cowpea biscuits, moong bean biscuits, moringa biscuits, moringa & cowpea pasta, murrukku, daliya & atta

				and lobia milk & bread spread from lobia milk. These products processing cost was low with no compromise of taste & nutritive value
Dr. Pragya Mishra 	Female	7007365955 pragyavasumishra@gmail.com	SRF	Associated in Organized 14 training programs , exposure visit and product development during project with co-P.I
Dr. Suman Maurya 	Female	8175890354 Sumanmaurya23gmail.com	SRF	Associated in Organized 14 training programs , exposure visit and product development during project with co-P.I

6.2. Details of visits of PIU-NAHEP officials at your AU along with photographs (provide list)

Dignitaries visited

	Dr.P.K.Ghosh National Coordinator, National Agricultural Higher Education Project – World Bank aided project, ICAR, New Delhi in 2017 visited the University on Dec 04-05, 2018 and
	Dr. Narendra Singh Rathore DDG Eduction ICAR New Delhi Chief guest of the programme
	Dr. Prabhat Kumar National coordinator, NAHEP World bank aided project) NAHEP, ICAR 2017 to till date
	7. Dr. R.K.Singh 8. Indian Council of Agricultural Research | ICAR · Division of Crop Sciences
	Dr Shashank Mauria, Former Assistant Director General, Indian Council of Agricultural Research Chief guest of the programme March 9-10 2019
	Dignified persons Padma Shri Professor Brahma Singh Former Director DRDO, March 12-18 20219

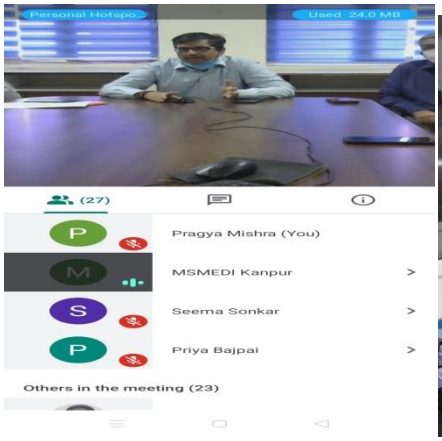

One Week Recent Technologies of Food Packaging


Recent Advances in Functional and Nutraceuticals for Future Foods


Two days National training Advance technology of food processing


Students Attend The training

Lecture delivered by Dr. Parikh NIFTEM, Sonepat



National level Awareness Program on Entrepreneurship Development in Agriculture and allied Sectors -2021

Visit in NCML

Twenty One days of National Training of Recent Advances in Functional and Nutraceuticals for Future Foods

Students Attended the training

Visit of Students in NCML

by Ajay Parikh

Certificate Distribution by P.I& C.P.I

Delivered lecture

Two days the training Program Advance technology of food processing

Visit of Students in Parle G Industry