RESEARCH HIGHLIGHTS

Research Network

The Directorate of Research with its headquarter at Kumarganj (Faizabad) governs the research activities in 26 districts belonging to seven revenue divisions viz; Faizabad, Basti, Devipatan, Gorakhpur, Varanasi, Azamgarh and Vindhyachal Dham of eastern U.P. under three agro-climatic zones i.e., North Eastern Plain Zone (NEPZ), Eastern Plain Zone (EPZ) and Vindhyan Zone (VZ). The university has seven research stations in different agro-climatic zones under its jurisdiction. These research stations are listed below.

Eastern Plain Zone:

- **Main Campus, Kumarganj (Faizabad)-** Centre for basic and applied research through different colleges in various disciplines of Agriculture, Horticulture and Forestry, Veterinary Science and Animal Husbandry, Fisheries, Agril. Eng. & Tech. and Biotechnology.
- **Crop Research Station (CRS), Masodha (Faizabad)-** It was established in 1951 as rice research station by U.P. Government. After establishment of the university in the year 1976, it was transferred to the university. The university named it as Crop Research Station, for rice research. The centre has developed 23 rice varieties covering all the ecosystems viz, upland, lowland, irrigated & inland salinity and hybrid rice. At present, 9 research projects financed by different state, national & international agencies are running at this centre. **This centre has been adjudged by ICAR as the best All India Coordinated Rice Improvement Project – Plant Breeding Centre for 2012-13.**
- **Zonal Agricultural Research Sub-Station (ZARSS) Baribagh & Ankushpur Ghazipur)**- Centre for crops research and seed production.

North Eastern Plain Zone :

- **Crop Research Station (CRS) Bahraich**- It was established by State Govt. as Jute Research Station U.P. in 1958. After establishment of the university, it was handed over by the State Govt. in July 1976 and was renamed as Crop Research Station, Bahraich. At present 06 research projects financed by State Govt. and national agencies are running at the centre. The centre has developed 03 varieties of Jute and 01 variety of Maize.
- **Crop Research Station (CRS) Ghaghraghat (Bahraich)**- The Crop Research Station, Ghaghraghat formerly known as Agriculture Flood Research Station, was established in 1958 and it was transferred to the university in 1976-77. It is only deep water research station in the state. At present 05 Research Projects Financed by State Govt. & ICAR are running at the centre. The centre has developed 04 rice varieties in which 03 have been released by SVRC.
- **Zonal Agril. Research Station (ZARS) Basuli (Mahrajganj)** – Centre for crop research and seed production.

Vindhyan Zone:

- **Zonal Agricultural Research Station (ZARS) Tissuhi, (Mirzapur)**- Centre for Pulses & Oilseed research and seed production.

Research Projects

Based on the location specific problems affecting productivity and farmers needs, the research programmes are formulated by the scientists concerned. At present 74 research projects/schemes, financed by various national and international agencies, are in operation in the university.

Sl. No.	Project	No. of Project
1	Research Projects AICRP- (75% ICAR+25% State)	28
2	Research Projects 100% funded ICAR	06
3	Research Projects funded by UPCAR	04
4	Research Projects funded by Others agency	15
5	Research Projects by International Organizations	05
6	Research Projects funded by State Govt. (Non Plan)	16
	Total :	**74**

IRRI- NDUAT Partnership : Under IRRI-NDUAT collaborative project entitled "Stress Tolerant Rice for Poor Farmers of Africa and South Asia" and DBT funded project on abiotic stress "From QTL to Variety ; Marker Assisted Breeding of Abiotic Stress Tolerant Rice Varieties with Major QTLS for Drought, Submergence and Salt Tolerance" efforts are being made to transfer the submergence tolerant gene, drought tolerant gene & salt tolerant genes in mega rice varieties through Marker Assisted Backcross Breeding (MABC). Development of Swarna Sub-1 by IRRI, Manila, Philippines is good beginning. Field evaluation/testing is process with IR-64 Sub-1 and Sambha Mahsuri Sub-1 at our university. Similarly drought tolerant gene from Ajucena (a drought tolerant japonica rice variety) is being introgressed in IR-64 and IR-64 isogenic lines possessing relatively higher degree of drought tolerance have been identified. In order to develop salt tolerant genotype for inland salinity areas, efforts are being made to transfer "Saltol" gene in popular varieties following marker assisted backcross breeding. Phenotyping of these introgressed lines developed by MABC will be done in target environments to identify tolerant varieties to various abiotic stresses.

A- Varietal Improvement :

The major research thrust in crop production has been to develop high yielding varieties of all important crops resistant to biotic and abiotic stresses. As a result, the university has so far developed 159 improved varieties of various crops out of which 137 varieties have been released at central/state level by central/ state Varietal Release Committee (CVRC/ SVRC) and the rest have been identified for release. The list of crop varieties developed by University is given in Table-1. A compendium of varieties developed has been published.

Registration of Varieties: 04 Wheat varieties namely NW-1012,1014,1067 & 2036 and 01 pigeon pea variety – Narendra Arhar-2 were registered by Protection of Plant Varieties & Farmers' Right Authority while registration of 11 rice and 01 wheat varieties are pending.

Patents if any :

The proposal of 6 technologies have been submitted to IPR for patenting.

NW-1012

NW-1014

NW-2036

Table- 1 Crop Varieties Developed by NDUAT

Crop	Name of varieties released/Identified	Total
Rice	Sarjoo-52, Narendra-1, Narendra-2, Narendra-80, Narendra-118, Narendra-97, Narendra-359, Jal Lahari, Jal Priya, Jal Nidhi, Barh Avrodhi, Narendra Usar Dhan-2, Narendra Usar Dhan-3, Narendra Sankar Dhan-2, Barani Deep, Narendra Sankar Usar Dhan-3, Narendra Dhan-8002, Narendra Dhan-2026 (Richa), Narendra Shushka Samrat (NDR-1045-2), Lalmati, NDR-2064, Narendra Narayani, Narandra Mayank, Narendra Jalpusp, Improved Swarna, Narendra Dhan- 3112-1, NDRK-5088, NDR- 9930111*, NDR-9930077*, NDR – 9930017*, NDR&2065] NDR &6093, NDRK &50002, NDGR-201, NDR-1055-6, NDR-2101, NDR-370133, NDR-370134*, NDR-6244, NDR-4058-7*, Sambha Sub-1, NDR- 9436	42
Maize	Shaktiman-1	1
Wheat	Narendra Wheat-1012, Narendra Wheat-1014, Narendra Wheat-1076, Narendra Wheat-2036, Narendra Wheat-1067, Narendra Wheat- 4018	6
Barley	Narendra Barley-1, Narendra Barley-2, Narendra Barley-3, Narendra Barley-4, Narendra Barley-1173, NDB-943, NDB-1445	7
Mung	Narendra Mung-1, Narendra Mung-2*	2
Urd	Narendra Urd-1, Narendra Urd-2*	2
Pigeon Pea	Narendra Arhar-1, Narendra Arhar-2, Narendra Arhar-3*	3
Lentil	Narendra Masoor-1, Narendra Masoor-2*	2
Mustard	Narendra Rai-1, Narendra Sarson-2, Narendra Ageti Rai-4, Narendra Rai-8 (NDYR-8), NDYS-2018 (Jagrati), NDRE-07	6
Linseed	NDL- 2004-05	1
Cauliflower	Narendra Gobhi-1	1
Brinjal	Narendra Brinjal-1, Narendra Hybrid Brinjal-1, Narendra Hybrid Brinjal-2, Narendra Hybrid Brinjal-3, Narendra Brinjal-2, Narendra Brinjal-3	6
Tomato	Narendra Tomato-1, Narendra Tomato-2, Narendra Tomato-5, Narendra Tomato-6, Narendra Tomato-3, Narendra Tomato-4, Narendra Tomato-7, Narendra Tomato-8	8
Vegetable Pea	Narendra Sabji Matar-1, Narendra Sabji Matar-2, Narendra Sabji Matar-3, Narendra Sabji Matar-4, Narendra Sabji Matar-5, Narendra Sabji Matar-6	6
Muskmelon	Narendra Kharbuja-1, Narendra Kharbuja-2	2
Colocasia	Narendra Arvi-1, Narendra Arvi-2, PKS-1*	3
Pointed gourd	Narendra Parwal-260, Narendra Parwal-307, Narendra Parwal-604	3
Banda	Narendra Banda-1, Narendra Banda-3*	2
Pumpkin	Narendra Agrim, Narendra Amrit, Narendra Abhooshan (NPH-1), Narendra Upcar	4
Bottle gourd	Narendra Sankar Lauki-4, Narendra Rashmi, Narendra Shishir, Narendra Dharidar, NDBG-104*, NDBG-132*, Narendra Madhuri, Narendra Shivani, NDBG&619, NDBG-10	10
Okra	NDO-10*	1
Bittergourd	Narendra Barahmasi-1, Narendra Barahmasi-2	2
Cowpea	Narendra Lobia-1, Narendra Lobia-2	2
Sweet Potato	Narendra Shakarkand-9, NDSP-10*	2
Elephant Foot	Narendra Zimikand-5*, Narendra Zimikand-9,	2
Turmeric	Narendra Turmeric-1, Narendra Turmeric-2, Narendra Turmeric-3	3
Coriander	Narendra Corinader-1, Narendra Corinader-2*	2
Fenugreek	Narendra Methi-1	1
Sauf	Narendra Sauf-1	1
Aonla	Narendra Aonla-4, Narendra Aonla-5, Narendra Aonla-6, Narendra Aonla-7, Narendra Aonla-10, Narendra Aonla-20	6
Bael	Narendra Bael-4, Narendra Bael-5, Narendra Bael-7, Narendra Bael-9, Narendra Bael-17*, Narendra Bael-16	6
Ber	Narendra Ber Selection-1*, Narendra Ber Selection-2*	2
Opium Poppy	Narendra Posta-1 (Kirtiman)	1
Mandookparni	Vallabh Medha	1
Babchi	IC-111226*	1
Lemongrass	NLG-84*	1
Jute	Reshma, NDC-9102, NDC-2008	3
Crotolaria	Narendra Sanai-1	1
Bajra (Forage)	NDFB-2, NDFB-3,	2
Oat	NDO-1, NDO-2	2
	Total	**159**

* Varieties identified in National Workshops/Group Meetings of AICRP's.

B- Technological Achievements

Location specific technologies regarding agronomic practices, fertilizer management, dry land agriculture, diara land management, cropping system, crop protection, vegetable production, horticultural crops, agro-forestry, aromatic & medicinal plants, mushroom production, apiculture, pisciculture, agro-meteorology, agricultural engineering and animal husbandry have been developed and popularized among the farmers. Achievements of All India Coordinated Research Projects has been published. The details of technologies generated by NDUAT are as follows-

Agronomical Practices :

- Varieties like- Halna, K-8962, Raj-3765, Raj-4134 and PBW-14 showed less percent reduction in growth, starch content and yield over control during heat stress condition.
- Among all the direct seeding methods, sowing of rice with DRR drum seeder gave highest yield.
- Ridge planting of pigeon pea (Arhar) gave 10-22% more yield over flat sowing.

Fertilizer Management :

- The substitution of 25-50% recommended nitrogen through farm yard manure or through green manure of Sesbania aculeata (dhaincha) with 75-50% recommended NPK doses through fertilizers to rice crop and 100% NPK through fertilizer to wheat may be adopted without any adverse effect on the yield.
- The maximum rice equalent grain yield (13.9 t ha^{-1}) as well as net return (Rs 62178 ha^{-1}) was obtained with the application of all the nutrients including micro (N150 P60 K120 S40 B_5Z_{25}) based on soil test basis. Omission of S, Zn, Mn & B reduced the net return of the rice-wheat system by Rs 9208, 10050, 1935 and 6458 ha^{-1} Yr^{-1} respectively. Omission of P caused maximum reduction of Rs 32104 ha^{-1} while K caused reduction of Rs 12969 ha^{-1} Yr^{-1}.
- Application of 25kg zinc sulphate ha^{-1} to both crops in rice-wheat system was more beneficial than its application to any of the crops but its application to rice showed higher residual response on wheat.
- Application of 20-25 kg sulphur per hectare was found to increase the yield of several pulse crops by 15-20% while 60 kg sulphur per ha through gypsum in mustard crop increased yield and quality of oil both.

Water Management

- Rice-Potato-Okra was found most remunerative cropping system. It is recommended at head of distributory.
- Maize-potato-okra was found most remunerative cropping sytem at tail end of the minor.
- Application of 75% RDF + 25% N through bio-compost was found more suitable with five irrigations at critical stages in wheat crop.

- Sowing of green gram on raised beds along with irrigation at 1.0 IW/PCPE or irrigation at 10 days interval is recommended.
- Pigeon pea grown on raised bed in paired rows at 50cm spacing intercropped with 3 rows of urd (blackgram) on raised beds was found more productive and remunerative system under poor availability of canal water at tail end of minor in kharif season, while intercropping of gram + mustard (4:1) was found more economical in rabi season.

Dryland Management :

- Under rainfed conditions seed priming (soaking of seed in water for 8 hrs prior to sowing) gave 9.2% increase in chickpea grain yield over non prime seed due to better plant population.
- To increase the yield of chickpea and for more profit, the seed inoculation of chickpea with PSB+Rhizobium and application of 60 kg P2O5/ha is recommended for rainfed area of eastern U.P.
- Application of 30 kg sulphur ha^{-1} either in form of gypsum or as elemental sulphur is recommended to increase the productivity of chickpea under rainfed condition.
- Sowing of lentil with the help of Pant Nagar Zero Till Drill Machine is more remunerative under rainfed condition.
- For higher income under rainfed condition of eastern U.P. either okra or kalmegh or turmeric may be intercropped with pigeonpea in additive series of sowing.
- Fodder (maize + cowpea)- lentil and blackgram- lentil cropping sequences are recommended for higher returns under rainfed conditions of eastern Uttar Pradesh.

Farming system :

- The integrated farming system with diversified cropping system, pisiculture and duckery were more profitable as compared to the conventional cropping system. The highest benefit cost ratio of 3.60 was observed in integrated farming system with cropping system of Rice-Lentil + Rai as compared to 1.94 in Rice – Wheat + Rai system.
- Rice (hybrid)-potato-green gram cropping system proved to be most remunerative with the net profit of Rs. 122374/ha followed by rice (hybrid)-mustard-black gram with Rs. 94137/ha. Adoption of hybrid rice (PHB 71) or basmati rice (Pusa basmati) was found more profitable than imbreed rice (Sarjoo-52).
- Three decades results revealed that in absence of phosphatic and /or potassic fertilizers, nitrogen alone failed to produce any positive effect on grain yield of both the crops in rice-wheat system.
- In NARP Zone 7 & 8, under irrigated conditions, rice-lentil system was found more remunerative than traditional rice-wheat system.
- In upland situations, Pigeon pea + black gram–wheat cropping system was more profitable recording Rs. 5613/ha/year additional income than Pigeon pea-wheat system. The negative net income was noted with urd-mustard as compared to pigeon pea-wheat system.

Crop Protection :

- Spraying of propiconazole @ 1 litre/ha at heading stage manages foliar blight, brown rust and karnal bunt of wheat.
- Monocrotophos 36 WSC @ 500 g/ha + Acephate 45%+ Cypermethrin 5% @ 500 g/ha or Thiocloprid 24% @ 120 g/ha were found most effective for controlling stem borer, leaf folder and whorl maggot.

- Soil application of Neem Cake @ 3-5 q/ha controlled nematodes and their related diseases in most of the crops.
- Planting of marigold 3-5 plants per pit prevented root knot nematode in pointed gourd (Parwal).
- A mixture of 1 g Vitavax and 1 g Thirum per kg of seed was found most effective to control smut and seed borne diseases in wheat and barley.
- Application of bio-control agent (*Psudomonas fluorisense*-Biocon B-4% + Vitavax 0.125%) effectively controlled the smut disease in wheat.
- Economic impact assessment for delay spraying of insecticide in mustard crop for aphid contorl caused a loss of Rs. 1130/day/ha.
- Population of gram pod borer was higher in non IPM fields while higher yield ranging from 20.32 to 24.20 q/ha was recorded in IPM fields of Basti district.
- Two hand weedings gave higher yield of rice (48.83 q/ha) in comparison to application of butachlor +propanil @ 1.12 + 1.12 kg/ha (42.68 q/ha).
- Cinosulfuron @ 15-20 g/ha or Oxadiangyl 70-100 g/ha or almix @ 4-6 g/ha can be used safely in transplanted rice for effective weed control.
- Anilophos @ 0.3 kg/ha at 4 DAT can be applied as spray or broad cast with sand for the control of weed effectively in transplanted rice.
- In wheat, Isoproturon @ 1.0 kg/ha as spray or broadcast mixed with sand can be applied at 30-35 DAS to control *Phalaris minor*.
- In late sown wheat, isoproturon @ 1.0 kg/ha + 2,4-D Na salt @ 0.5 kg/ha as tank mixed may be use safely as post emergence.

Resource Management :

- Zero tillage technique of wheat sowing to avoid delay in field preparation has been noted to compensate for reduced yield and save money on account of lesser use of energy and equipment. PBW 343, PBW 443, HD 2733, NW 1012, HUW 468, K-9107 and NW 1014 gave superior performance under zero tillage.
- Sencar applied @ 250 g/ha followd by leader applied @ 33 g/ha gave effective and economical weed control.

Vegetable Production :

- Maximum net return was obtained with vegetable based intercropping of Arvi+Chilli.
- In rice-potato-wheat crop rotation Kufri Ashoka variety of potato was found most suitable in comparison to other varieties due to its early maturity. It could be harvested after 70-80 days of planting.
- For weed management in Parwal, highest net income and cost-benefit ratio were obtained with paddy straw mulch which produced 127 q/ha fruit yield.
- Maximum fruit yield (332 q/ha) of Narendra Tomato-2 alongwith maximum cost-benefit ratio (1:3.45) was obtained with Dhaincha green-manuring + half dose of recommended NPK (60:30:30 kg/ha) transplanting at 60 x 45 cm spacing.
- Application of 240:180:80 kg NPK/ha in hybrid capsicum var. Bharat gave maximum yield (195.60 q/ha), net-income and cost-benefit ratio (1:4.22).

Horticulture :

- Narendra Ber Selection-1 and 2 continuously gave excellent performance with respect to yield, size and quality of fruits.
- Foliar application of 2% urea along with 250 ppm Ethrel one month after fruit setting was found most effective to induce early ripening, higher yield and better quality of guava fruits.

- A suitable technique for integrated management of mango malformation, caused by *Fusarium monoliformis*, has been developed by the university.
- 50% pruning of I year old in determinants shoot give maximum fruit yield and better quality fruit.
- Application of 0.5% Zinc sulphate + 0.1% Thio urea followed by 0.5% Borax + 0.1% Thio urea were given to improve plant growth, fruit set, yield and quality attributes.

Medicinal and Aromatic plants :

- NDAS-4 found to be maximum root yielding genotype of Asparagus.
- Nutrient level of 50:30:20 kg nitrogen, phosphorus and potash/ha along with bio-fertilizer (VAM) proved best treatment combination with respect to seed, latex and husk yields of opium poppy.
- Maximum seed yield of Isabgol (16.60q/ha) was recorded in line sown crop with fertilizer application @ 50 kg N + 2kg PSB/ha.
- NDH-1 was found best for latex yield in opium poppy.

Mushroom Production :

- In order to get more yield and net profit, *Pleurotus, Volvariella* and *Agaricus bisporus* were found most suitable.
- Cheap and easily available organic materials like paddy straw, wheat straw and groundnut shell are being successfully used for mushroom production.

Apiculture :

- Apiculture with *Apis mellifera* in arhar, mustard and sunflower crops could produce 50-70 kg honey/ha. It also helped to increase the yield of these crops by about 40-50%.

Agro-meteorology :

- Agro-advisory bulletins are prepared and distributed among the farmers. Short term weather forecasting is also being done which helps the farmers in planning the farm operations for obtaining higher production in adverse weather conditions.
- Oct.30th sowing of chickpea was characterized by optimum temp. during vegetative and reproductive phase hence it was more congenial for crop growth. Crop sown in Nov. exposed relatively lower temperature during vegetative phase and higher temp. during grain filling stage which adversely affected the crop growth and yield.

Agricultural Engineering :

- Semi automatic potato planter-ridger was successfully tested. The effective field capacity of this machine was found to be 0.2 ha/hr with labour saving of 75 man days/ha.
- It was found that sowing can be advanced by 7-10 days by using Pantnagar Zero till seed-cum-fertidrill and strip till-drill machines. It was also observed that these machines are labour saving and gave higher returns in comparison to conventional method.
- Tractor mounted semi-automatic two-row sugarcane sett cutter planter was tested and its field efficiency was found to be 0.2 ha/hr. Four persons including tractor driver are required to operate this machine which does the job of furrow opening, sett cutting and cropping, fertilizer placement and sett covering simultaneously.

- Tractor mounted rotavator has been tested and operated in more than 500 ha area. The field capacity of this machine was found to be 0.25 ha/hr in first operation. It prepares the field in one operation as good as 4-6 operations with cultivator or harrow.

Agro forestry :

- Under 7-year old agroforestry plantation of *Populus deltoids*, the grain yield for wheat variety NW-1067 (1.75 t ha^{-1}) was higher than those of other varieties. Grain yield reduction for wheat under same system in comparison to open area ranged from 35.2% to 38%. During Kharif, of the three varieties of paddy sown under same system, Narendra Usar-3 variety had higher grain yield (2.50 t/ha^{-1}) than other varieties.
- There was a concentrated leaf litterfall in *Populus deltoids* based system during October-January. During this period, leaf litter accounted for about 88.9% of the total annual leaf fall (516 g $m^{-2}yr^{-1}$). After decomposition litter had 64.8% dry weight loss over annual cycle. Carbon dioxide evolution (root+soil+litter) from this systemamounted to about 284 g. $M-^{2}Yr^{-1}$.
- In case of medicinal herbs cultivated in *C*. *equisetifolia* based agri-silvi system FYM application showed greater crop yield (3.07 t ha^{-1}) for *Andrographis*. *Paniculata* than other treatments. In Matricaria, Chamomilla, FYM application also showed greater flower yield (0.34 t ha^{-1})
- Under *D*. *sissoo* based silvipastoral system, the green herbage yield was maximum (27.07 t ha^{-1}) for *Pennisetum purpureum* and minimum (16.75 t ha^{-1}) for *Panicum*. Maximum grass.
- The average paddy grain yield across agri-silviculture systems under six *P. deltoides* clones was better as well as almost equal (2,0-2.06 t ha^{-1}) for Narendra Usar-3 and Sarjoo-52. On the whole, G-48 followed by Pant-5 and L-52 indicated better paddy grain yield than rest of the three clones.

Animal Husbandry :

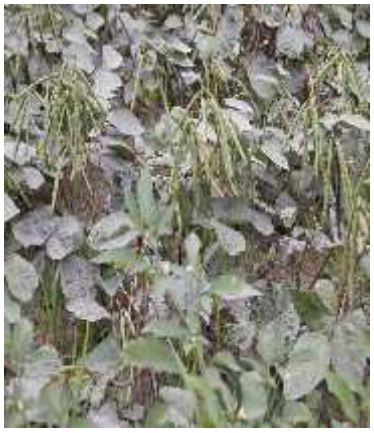
- Improved breed of buffalo, housing design and complete health package suited specially for the agro-climatic conditions of eastern U.P. is being developed.
- Low cast feed using locally available agricultural products and natural resources have been developed.
- Semen bank of improved breed/strains of various livestock species is being established.
- Working on development of technology to produced calf of desired sex through artificial insemination with sex sorted spermatozoa at farmers' field.
- Training of veterinarians, paravets, local youth, house wives of livestock farmers are being conducted.

Impact of Research

I. Adoption of varieties developed by the University:

- The improved varieties developed by the university are being adopted by the farmers of the State as well as of other States.
- The paddy varieties developed for different ecologies such as Sarjoo-52, NDR-97, NDR-359, Jal Priya, Narendra Sanker Dhan-2, Barh Awarodhi, Narendra Usar Dhan-2, Narendra Usar Dhan-3, Narendra Shankar Usar Dhan-3, Narendra Susk Smart, Narendra Narayani, Narendra Mayank, Narendra Jalpusp & Swarna Sub-1 are very popular among the farmers under various rice ecosystems.
- Narendra Barley-2 and Narendra Barley-1173 has great demand on the farmers' field in Etawa and Agra-regions & NDB-1173 in sodic soils ecosystem.
- In rice-potato-wheat-moong/urd crop rotation, NDR-97 variety of rice has been widely accepted by the farmers due to its short duration and higher yield.
- In normal, rainfed and saline-sodic soils, Narendra Rai-1 is more popular among the farmers due to its high yield potential and more oil content.
- The common and hybrid varieties of different vegetable crops developed by the university have greater acceptance among the farmers of U.P. and other states.

Narendra Shankar Dhan-2

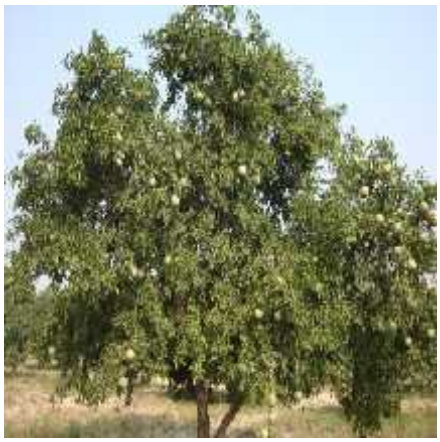


Narendra Mung-1

NDBG-104

- Narendra Aonla-6,7 and 10 due to their high yield potential, have greater demand among the farmers of Maharastra, Gujarat, Madhya Pradesh, Rajasthan, Andhra Pradesh and Tamil Nadu in addition to Uttar Pradesh.

Narendra Aonla-7



Narendra Bael- 5

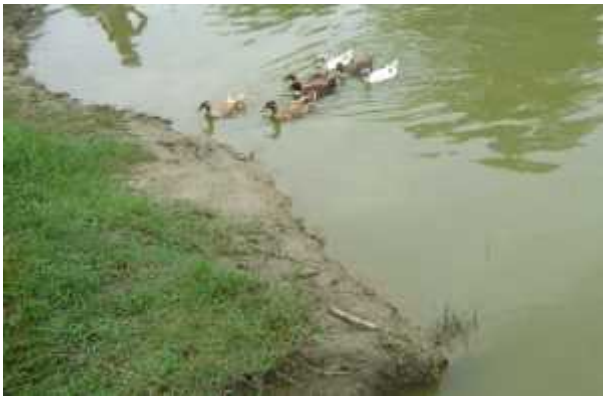
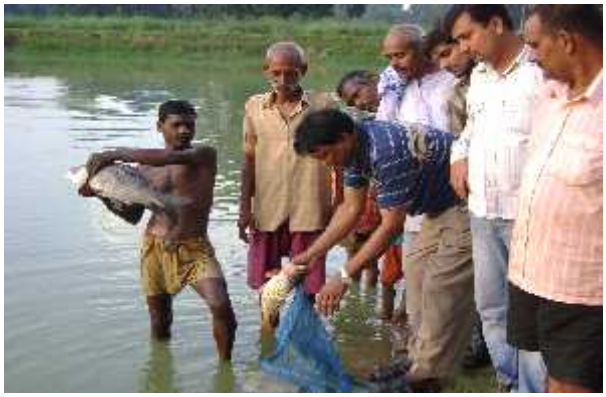
- Narendra Bael-5 and 9 are popular among the farmers of Uttar Pradesh.
- The opium poppy variety-Kirtiman is very popular among the farmers in U.P.
- Tractor operated semi-automatic belt type potato planter ridge is widely used in eastern U.P. and about 850 machines are in operation.
- Pantnagar Zero-till seed cum ferti-drill is getting popularity in more moist areas where sowing of wheat is either delayed or not possible due to late harvesting of rice. The direct seeding of rice under dry condition by zero-till seed cum ferti-drill with chemical weed control gave at par results as compared to transplanted rice. However, DSR crop matured 7-10 days earlier.

DSR under dry condition with Zero-till seed drill

Improved water management practices in rice

- Timely harvesting of rice and wheat could be made possible due to use of combine harvester. It reduces labour dependency and losses due to climatic factors & fire etc.

- The improved water management practice developed for wheat in canal command area (three irrigations each with 6cm water at crown root initiation, late jointing and milking stage with 50 to 100 m^2) has been in practice in large area of eastern U.P. which increased the yield of wheat and saved irrigation water. Similarly in rice irrigation of 5±2 cm given at 1-3 days after disappearance of ponded water saved 25 to 40% water without reducing yield of rice as compared to traditional practice of maintaining continuous submergence of 7 to 10 cm. The multi use of water through integrated farming system gave 3-4 time more water productivity as compared to rice-wheat cropping system.

Multiple use of Water

- Pigeon pea grown on raised bed in paired row at 50 cm spacing intercropped either 5 rows of rice (NDR-97) or 3 rows of urd in sunken bed has been practiced and becoming popular in the tail end of the canal command.
- The practice of direct seeding of rice (DSR) either under dry or wet condition and managing weeds chemically is getting preference by farmers over transplanted rice because of saving in seed, labour, water and time and reduced maturity time by 7-10 days as well as drudgery.

II- Seed Production :

- The prime responsibility of the university is to produce breeder and foundation seeds. The breeder and foundation seeds of different crops produced by the university at its research and seed multiplication farms (Table-2) are made available to different seed agencies such as National Seed Corporation, State Seed Farms and U.P. Seed Development Corporation, etc. as per their demands for further multiplication as foundation/certified seed. These seeds are made available to the farmers by seed agencies. In this way, the university plays a major role in seed production and its replacement in the state. University produced 2999, 5043, 4955 3101 and 2688 q. breeder seed and 6840, 4400, 5468, 6764 and 8072 q. foundation seed during 2008-09, 2009-10, 2010-11, 2011-12 & 2012-13, respectively.

Research and Seed Multiplication Farms

Sl. No.	Name of the Farm	District	Total area of the farm (ha.)	Cultivable area (ha.)
1.	MES, Kumarganj	Faizabad	125.25	18.00
2.	CRS, Masodha-I	-do-	50.00	32.00
3.	CRS, Masodha-II	-do-	26.02	20.00
4.	CRS, Masodha-III	-do-	34.76	12.00
5.	NSP Farm I, Kumarganj	-do-	55.00	26.00
6.	NSP Farm II, Kumarganj	-do-	40.00	24.00
7.	NSP Farm III, Kumarganj	-do-	40.50	18.00
8.	NSP Farm IV, Kumarganj	-do-	40.00	28.00
9.	NSP Farm V, Kumarganj	-do-	38.00	16.00
10.	CRS, Bahraich	Bahraich	19.40	14.00
11.	CRS, Ghaghraghat	-do-	37.00	33.00
12.	CRS, Barabagh	Ghazipur	06.40	04.00
13.	CRS, Ankushpur	Ghazipur	16.37	10.00
14.	CRS, Tissuhi-I	Mirzapur	11.66	08.80
15.	CRS, Tissuhi-II	-do-	37.60	26.00
16.	CRS, Basuli	Mahrajganj	21.68	15.00
	Gross Total :		**599.64**	**304.80**

- **Mou renewed Between NDUAT & Indo-Gulf Fertilizer Ltd:** MOU was signed between NDUAT & Indo-Gulf Fertilizesr Ltd in 2005 for commercial Hybrid seed production of Narendra Shanker Dhan-2. Which was renewed in 2010 for next five years.
- **Mou Signed Between NDUAT & Nuziveedu Seeds Ltd:** In order to popularize the NDRH- 2 (Narendra Shankar Dhan -2) and generating additional resources, MOU has been signed between **NDUAT & NUZIVEEDU SEEDS LTD** for commercial hybrid seed production. Accordingly Rs. 5.00 lacs have been received from Nuziveedu Seeds Pvt. Ltd. In lieu of parental lines being supplied to them. As per reports available, Nuziveedu Seeds Pvt. Ltd. Produced 10-11 tons hybrid rice seed of NDRH-2 during 2012.

III- Usar and Wasteland Management :

- University has done excellent work in Usar and wasteland management which is applauded at National and International levels. The agro-techniques developed by the University for usar and wasteland management have greater acceptance among the farmers for plantation of fruits and forest crops on their lands.
- In usar and wastelands, the pits were filled with soil, sand and compost in the ratio of 2:1:1 without gypsum/pyrite and Aonla, Bael, Ber and Forestry plants were planted. By using this technique the plants grow well and the soils also improve. The technique is very popular among the farmers.

Crop varieties developed by University

Varieties released/identified	Year of release	Potential yield (q/ha)	Salient characteristics
A. Cereals			
Rice			
Sarjoo-52	1980	55-60	Maturity 130-135 days. Resistant to BLB & Bacterial leaf streak. Suitable for irrigated areas of U.P.
Narendra-1	1981	40-45	Maturity 105 days. Resistant to BLB. Suitable for rainfed upland multiple cropping system.
Narendra-2	1982	45-50	Maturity 112-115 days. Resistant to BLB. Suitable for irrigated early paddy growing situations.
Narendra-80	1986	45-50	Maturity 110 days. Suitable for multiple cropping system.
Narendra-118	1987	40-45	Maturity 85-90 days. Resistant to blast. Suitable for direct seeding under rainfed upland conditions.
Narendra-97	1992	45-50	Maturity 90 days. Resistant to BLB, blast, sheath rot, brown spot. Suitable for direct seeding in rainfed upland conditions.
Narendra-359	1992	60-65	Maturity 130-135 days. Moderately resistant to BLB.
Jal Lahari	1993	40-45	Maturity 140 days. Moderately resistant to BLB. Suitable for rainfed shallow low land situations.
Jal Priya	1993	35-40	Maturity 150-160 days. Suitable for semi deep water situations (50-100 cm water depth)
Jal Nidhi	1993	45-50	Maturity 215-225 days. Suitable for deepwater situations (100-250 cm water depth)
Barh Avrodhi	1995	35-40	Maturity 145-155 days. Suitable for flash/intermittent flood situations.
Narendra Usar Dhan-2	1996	45-50	Maturity 120-125 days. Suitable for saline-alkali soils.
Narendra Sankar Dhan-2	1998	65-70	Maturity 125-130 days. Resistant to blast and BLB. Suitable for irrigated conditions.
Narendra Usar Dhan-3	1999	45-50	Maturity 125-130 days. Resistant to BLB, sheath blight, sheath rot, brown leaf spot, false smut. Suitable for saline-alkali conditions.
Barani Deep	2000	30-35	Maturity 95-100 days. Resistant to brown spot and BLB. Suitable for rainfed upland multiple cropping system of eastern Uttar Pradesh.
NDURH-3	2002	60-65	Maturity 125-130 days. Resistant to brown spot and BLB, suitable for sodic (Usar) and normal soils.

NDR- 8002	2004	40-45	Maturity 135-140 days, Resistant to White Brown Plant Hopper (WBPH) and Leaf Blast. Better export quality, suitable for late sown condition of rain fed low land areas. Recommended for eastern U.P., West Bengal, Orissa and Chhattishgarh states.
NDR –2026 (Richa)	2004	45-50	Maturity 110-115 days, Plant height 80-90 cm., medium early duration, resistant to brown spot and sheath rot diseases.
Shusk Samart	2005	35-40	Maturity 100-105 days, for direct seeded rainfed upland condition of U.P, Orissa & Bihar
Lalmati	2007	30-35	Maturity 115-120 days, irrigated, mid early.
NDR-2064	2007	45-50	Maturity 120-125 days, irrigated, mid early, moderately resistant to BLB, ShB, ShR and Brown spot.
Narendra Narayani	2008	43-45	Maturity 115 days, suitable for irrigated low land conditions of U.P.
Narendra Mayank	2008	43-45	Maturity 110 days, tolerant to submergence, suitable for flood prone areas of U.P.
Narendra Jalpusp	2008	42-47	Maturity 113 days, long bold grain, suitable for irrigated late sown & rainfed low land areas of U.P.
Improved Swarna (Swarna-Sub-1)	2009	55-60	Maturity 150-155 days, medium fine, small highly submergence tolerant.
Narendra Usar Dhan- 2008	2009	45-50	Maturity 120-125 days, long bold, Suitable for salt affected soils of West Bengal, Andhra Pradesh and Orissa
NDR- 3112-1	2009	45-50	Maturity 125-130 days, long bold, suitable for irrigated conditions.
NDR- 9930111	2009	50-60	Maturity 145-150 days, medium bold, highly submergence tolerant
NDR- 9930077	2009	45-50	Maturity 145-150 days, semi deep ecology, medium bold, highly submergence tolerant
NDR – 9930017	2009	40-45	Maturity 145-150 days, long slender, good for delayed planting, submergence tolerant.
NDR-2065	2010	50-55	Maturity 120-125 days, long bold grain, suitable for early sown condition, resistant to sheath rot.
NDR-6093	2010	35-40	Maturity 125-130 days, aromatic long slender grain with Basmati feel.
NDRK-50002	2010	45-50	Maturity 120-125 days, medium bold grain with good cooking quality. Tolerant to Usar soil, resistant to lodging and shattering.
NDGR-201	2012	35-40	Submergence tolerant, maturity 155 days, Moderately resistant to brown spot & stem borer, resistant to grain shattering, suitable for rain-fed low land condition.

Wheat			
Narendra Wheat-1012	1997	50-60	Maturity 120-130 days. Resistant to rust. Suitable for timely sown irrigated conditions of North Eastern Plain Zone.
Narendra Wheat-1014	1997	40-45	Maturity 100-112 days. Resistant to rust, foliar blight, Karnal bunt and loose smut. Suitable for late sown conditions of North Eastern Plain Zone.
Narendra Wheat - 1076	2002	50-60	Maturity 108-110 days. Resistant to saline and sodic conditions; brown, black and yellow rusts and foliar blight. Suitable for late and very late sown conditions of whole U.P.
Narendra Wheat-2036	2002	45-50	Maturity 108-110 days. Resistant to rusts and tolerant to foliar blight. Suitable for late and very late sown conditions of North Eastern Plain Zone.
NW -1067	2004	50-60	Maturity 121-125 days, tolerant to saline alkali soils, protein 12.37%; resistant to lodging, shattering and brown rust; recommended for timely sown, irrigated, high fertile salt affected soils.
Barley			
Narendra Barley-1	1999	25-30	Maturity 110-115 days. A hulled, six rowed barley. Tolerant to smut, rust and salinity-alkalinity. Suitable for normal and late sown conditions.
Narendra Barley-2	1999	45-50	Maturity 100-110 days. Six rowed variety. Tolerant to smut and rust. Suitable for irrigated and timely sown conditions.
Narendra Barley-3	2000	25-30	Maturity 110-115 days. A hulled, six rowed variety. Resistant to foliar diseases. Suitable for saline-sodic conditions and malt based industries.
Narendra Barley-4	2002	35-40	Maturity 105-110 days. A hulled, six rowed barley. Resistant to major diseases and insects. Suitable for rainfed, saline-sodic conditions and late sowing in irrigated conditions.
NDB-1173	2003	35-40	Maturity 115-120 days. A hulled, six rowed barley having dwarf plant stature. Suitable for saline-sodic conditions; resistant to foliar blights, rusts, aphids, shattering and lodging. It yields reasonably well at low fertility levels.
NDB-943	2007	35-45	Maturity 115-120 days, hull less, bold seeded, mid early maturity. Suitable for saline and alkaline conditions of U.P.

B. Pulses			
Narendra Mung-1	1992	12-15	Maturity 60-70 days. Resistant to Mung Yellow Mosaic Virus (MYMV), Rhizoctonia blight and Cercospora leaf spot. Suitable for both kharif and zaid seasons.
Narendra Mung-2	2005	15-18	Maturity 70-75 days, resistant to yellow mosaic virus, tolerant to major insect pests, suitable for kharif season. More than 25% yield superiority over check variety PDM-54 & Pant M-4.
Narendra Urd-1	1992	12-15	Maturity 80 days. Resistant to MYMV. Suitable for kharif season.
Narendra Urd-2	2003	13-15	Maturity 80-85 days, bold seeded, resistant to MYMV and Cercospora Leaf Spot. Suitable for kharif in EPZ and summer in NEPZ.
Narendra Arhar-1	1996	25-30	Maturity 255-260 days. Resistant to sterility mosaic and tolerant to wilt and Phytophthora blight.
Narendra Arhar-2	2004	25-33	Maturity 240-250 days, resistant to Sterility Mosaic Virus and Wilt; tolerant to pod borer. Bold seeded with higher Dal recovery. Suitable for timely and late sown conditions.
Narendra Arhar-3	2006	18-20	Maturity 210-215 days, suitable for pre-rabi sowing, resistant to sterility mosaic virus & phytophthora blight and tolerant to wilt.
Narendra Masoor-1	1996	18-22	Maturity 130-135 days. Resistant to rust and tolerant to wilt and root-rot diseases.
Narendra Masoor-2	2002	22-25	Maturity 125-130 days. Resistant to rust, wilt and root rot diseases. Suitable for both irrigated and rainfed conditions.
C. Oilseed Crops			
Narendra Rai-1	1990	25-30	Maturity 120-125 days. 21% more yield than Varuna; 40% oil content. Resistant to downy mildew. Tolerant to salinity and alkalinity
Narendra Sarson-2	1996	12-18	Maturity 125-130 days. 46% oil content. Resistant to white rust, downy mildew and Alternaria blight.
Narendra Ageti Rai-4	1999	15-20	Maturity 100-105 days; 40% oil content., 8-10 q/ha yield in September sown crop. Resistant to white rust and downy mildew; tolerant to salinity and alkalinity. Suitable for multi cropping system.
NDYR-8	2004	15-20	Maturity 130-135 days, plant height 190-195 cm., yellow colour grain, tolerant to white rust and Alternaria blight, oil content 45.7%, recommended for U.P.
NDYS-2018 (Jagrati)	2007	15-20	Medium bold seeds, tetralocular, upright siliquae, oil content 43.17%.

D. Vegetable Crops			
Narendra Gobhi-1 (Cauliflower)	1992	300	Early in mid season group. White and solid flower with average weight of 700 g per head.
Narendra Brinjal-1	1992	325-350	Oblong fruits. Dark violet colour, medium size plant. Suitable for winter and rainy seasons.
Narendra Hybrid Brinjal-1	1995	500-550	Round and big fruits, violet colour, fleshy with less seed. Tolerant to phomopsis leaf blight.
Narendra Hybrid Brinjal-2	1996	550-600	Long fruits, colour bright violet. Resistant to stem and fruit borers.
Narendra Hybrid Brinjal-3	1999	500-550	Fruiting in 70-80 days. Round large fruit; colour bright violet; soft, less seeded. Moderetely resistant to Alternaria leaf blight, phomopsis leaf blight and Sclerotinia wilt, shoot and fruit borer in field condition. Suitable for cultivation in summer, rainy and winter seasons.
Narendra Brinjal-2 (NDB 28-2)	2005	375-450	Fruits long, dark purple shining colour, soft texture and less seeded. Medium maturing variety, takes 70-75 days for first fruit harvest.
Narendra Brinjal-3	2007	350	Early in maturity, fruits long, medium thick, shining purple colour, highly tolerant to fruit & shoot borer.
Narendra Tomato-1	1996	450-500	Fruit medium to large, suitable for table and processing purposes. Averge fruit weight 75-100 g. Tolerant to diseases and fruit cracking.
Narendra Tomato-2	1995	400-450	Medium fruit size, average weight 50-75 g/fruit, dark red colour. Resistant to early and late blight and leaf curl virus.
Narendra Tomato-3	2005	350-400	Plants green, determinate type. Fruits small to medium size, flat, round, grooved. First fruit harvest 60-65 days after transplanting. Tolerant to root-knot nematode.
Narendra Tomato-4 (NDT-9)	2005	350-375	Early maturing variety; plant green, indeterminate type fruits medium to large size, flat, round, slightly grooved, acidic in taste.
Narendra Tomato-5	2001	380-410	Medium early, solid fruit size, fleshy fruit. More tolerant to diseases and insects in comparison to other varieties.
Narendra Tomato-6	2001	400	Medium late; medium to large size, solid and fleshy fruits. Resistant to nematodes.
Narendra Tomato-7 (NDTS-2001-3)	2007	400-425	Plant dwarf, round solid fruits of acidic nature. Highly tolerant to curl virus, good keeping quality and suitable variety for processing. Recommended for cultivation in Punjab, U.P. & Bihar.
Narendra Tomato-8	2007	350-400	Plant indeterminate, fruits round medium thick pericarp, resistant blight & moderately resistant to leaf curl virus.
Narendra Sabji Matar-1	1996	80-100	Early, medium to long pod size. Resistant to powdery mildew.

Narendra Sabji Matar-2	1997	85-95	Medium early, sweet grains. Resistant to diseases.
Narendra Sabji Matar-3	1999	85-100	Long pods with 8-10 grains; very sweet grains. Fruiting within 70-75 days.
Narendra Sabji Matar-4	2001	140-150	Plant height 70-75 cm, long green pods with 8-9 grains, medium early. Resistnat to powdery mildew and rust.
Narendra Sabji Matar-5	2001	110-120	Medium plant height (70-75 cm). Maturity 80-85 days. Medium long pods with bold seed. Resistant to powdery mildew.
Narendra Kharbuja-1 (Muskmelon)	1998	175-200	Medium fruit (Av. wt. 700 g/fruit), very sweet taste (10-12% TSS)
Narendra Kharbuja-2 (NDM-15)	2005	150-200	Fruits oval round, light orange colour with green strips at maturity, medium size fruits with smooth skin, excellent musky flavour. First fruit harvest in 70-75 days.
Narendra Arvi-1 (Colocasia)	1998	120-125	Maturity 170-180 days (early); can be harvested after 140 days. Less acridity. Soft and easy to cook. All parts are edible. Tolerant to Phytophthora blight. Suitable for summer and rainy seasons.
Narendra Arvi-2 (Colocasia)	1999	120-125	Maturity 182-196 days (medium). Can be harvested in 150 days after sowing as per requirement. Tolerant to Phytophthora blight, less acridity, soft and easy to cook.
Arvi PKS-1 (Colocasia)	2002	270-280	Maturity 150-170 days, early. Suitable for all types of soils.
Narendra Parwal-260 (Pointed gourd)	2001	200	Fruits 13-15 cm long, stripped, green, thick flesh, suited both for vegetable and sweet making. Planted in single stake system at 1.25 x 1.25m spacing. Tolerant to vine borer and wilt disease.
Narendra Parwal-307	2001	230	Small, round, stripped, green fruits and have good self life. Planted in single, stake on bamboo at 1.25 x 1.25 m. spacing.
Narendra Parwal-604	2001	200	Medium size, plain light green colour fruits without strips. Planted in single stake system at 1.25 x 1.25 m. spacing.
Narendra Banda-1	2001	350	Digging in 180-195 days, Suitable for chips making. Resistant to Phytophthora blight. Suitable for Zaid season.
Narendra Banda-3	2002	280-300	Digging in 180-210 days. Medium size, soft and tasty.
Pumpkin Narendra Agrim	2001	255	Short vined, very early and small fruited variety. First picking within 55 days in summer. Fruits round and dark green. Suitable for summer season. Tolerant to Yellow Vein Mosaic Virus (YVMV)

Pumpkin Narendra Amrit	2001	330	Medium maturing, first picking within 65 days in summer. Flat rounded fruits with light green mottled colour. Papery skin, thick flesh and small seed cavity. Green as well as mature fruits are good for highly palatable vegetable preparations. Green fruits also suitable for salad and mature fruits for juice and sweet preparation. Tolerant to YVMV.
Narendra Pumpkin Hybrid-1 (Narendra Abhooshan)	2005	600	It is early hybrid, first picking in about 55 days during summer, fruits attractive round, dark green and mottled. It has shown field tolerant against curcumas virus-1
Narendra UPCAR (Pumpkin)	2007	400-500	Small fruit, dark green strived, fruit skin, field resistant against pumpkin mosaic virus, suitable for rainy season cultivation.
Narendra Sankar Lauki-4 (Bottle gourd)	2001	365	Early hybrid, first picking within 55 days in summer. Fruits are medium long, near cylindrical in shape and light green in colour. Suitable both for summer and rainy seasons.
Narendra Rasmi (Bottle gourd)	2001	410	Bottle shaped fruits. First picking within 65 days. Suitable for cultivation in all the seasons. Resistant to anthracnose during rainy season.
Narendra Shishir (Bottle gourd)	2001	675	Round fruits, first picking within 85-90 days. Suitable for winter season cultivation. Resistant to anthracnose, downy mildew and fruit fly.
Narendra Dharidar (Bottle gourd)	2001	200	Bottle shaped fruits having green strips. First picking within 60 days. Green fruits can be eaten as salad.
NDBG-104 (Bottle gourd)	2002	360	Fruit long cylindrical.
NDBG-132 (Bottle gourd)	2004	450	An early homogenous variety with attractive bottle shaped, slender long fruits; suitable for early sowing.
Narendra Shivani (Bottlegourd)	2007	700-1000	Winter season type variety, sowing time mid July, prolific bearer, fruits very long and slender, suitable for kitchen garden.
Narendra Madhuri (Bottlegourd)	2007	800-1100	Winter season type variety, sowing time mid July, fruits round and palatable cooked vegetable.
Narendra 619 (Bottlegourd)	2009	1100	Suitable for eastern plain zone.
Narendra Barahmasi -1 (Bittergourd)	2007	250	Rainy/winter type variety, fruits available for picking after 60 days of sowing, fruits are long, suitable kitchen garden
NDO-10 (Okra)	2005	75-80 (Rainy season) 40-50 (Summer season)	Suitable for both summer and rainy season, first fruit harvest in 35-40 days in summer & 45-50 days in rainy season. Fruits are 10-15 cm. long, dark green colour with five ridges, resistant to yellow vein mosaic virus.

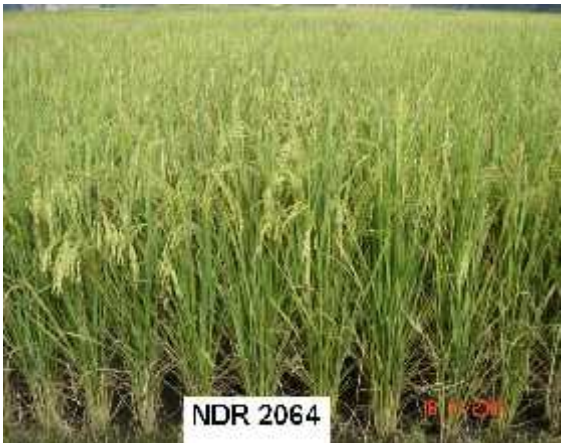
Narendra Lobia-1 (Cowpea)	1995	100	First picking in 60 days. Long pods, very early in flowering and fruiting. Recommended for UP and Bihar.
Narendra Lobia-2 (NDCP-13)	2005	75-100	Plant bushy type with dark green, long, fleshy pods. Early maturing variety, green pods ready for first harvest in 50 days after sowing. Mature seeds red in colour
Narendra Sakarkand-9 (Sweet Potato)	2001	140-150	Digging in 120-130 days under un-irrigated condition and 260-270 days in irrigated condition. Tuber sweet, soft and easy to cook. Suitable for both kharif and rabi seasons.
Sweet Potato NDSP-10	2002	280-300	Digging in 120-130 days. Medium, red colour tuber with sweet taste. Suitable for all conditions.
Zimikand NDA-5 (Elephant Foot)	2002	600-700	Maturity in 190-200 days. Medium size, tasty and less acid content.
NDA-9 (Elephant Foot)	2006	650-800	Maturity 180-210 days, early variety, testy and less acid content.
Narendra Turmeric-1	2007	300-350	Digging in 200-210 days, has 2-3% essential oil, 5-6% curcumin, 19.08% dry matter & 9.8% oleoresin and moderately resistant to leaf blotch and leaf spot diseases.
E. Horticultural Crops			
Narendra Aonla-4	1987	1 q/plant	Fruits large and smooth, an early maturing variety.
Narendra Aonla-5 (Krishna)	1987	1 q/plant	Plant semi tall; large and triangular fruits, less fibrous, highly astringent. Early maturing and shy bearing.
Narendra Aonla-6	1993	1-1.5 q/plant	Large and bright fruits. Most ideal for preserve making and excellent for processing.
Narendra Aonla-7	1990	1-1.5 q/plant	Fruits medium to large, medium maturity. Resistant to necrosis diseases.
Narendra Aonla -10	1995	1-1.5 q/ha	Very early, fruit flattened, round, medium in size.
Narendra Aonla - 20	2005	1-1.5 q/ha	Bold Size, mid early maturity
Narendra Bael -4	1990	0.70-0.80 q/tree	Fruits oval round, small, fruit quality good.
Narendra Bael -5	1990	70-80 fruits/tree	Fruit size medium, round, fleshy and less seeded.
Narendra Bael -7	1990	0.80-0.90 q/tree	Fruits large in size, fruit quality excellent, moderately seeded.
Narendra Bael -9	1990	60-70 fruits/ tree	Fruits medium to large and oval in shape. More sweet fruits with less seed.
Narendra Bael -17	2004	40-50 fruits/tree	Fruits oblong, big sized, fruit quality excellent, seed content less.
Narendra Bael-16	2006	70-75 fruit/tree	Elliptical round, pulp yellow, Av. weight 1.3 kg, TSS 31%, medium seed and low fibre content.
Narendra Ber selection-1	2004	0.80 q/tree	Fruits oblong to round, quality excellent, big sized.
Narendra Ber selection-2	2004	0.65 q/tree	Fruits oblong, moderate, quality excellent.

F. Medicinal and Aromatic Plants			
Opium poppy Narnedra posta-1 (Kirtiman)	1991	8-10 q/ha seed and 45-50 kg latex/ha	Morphin content 11-12%. Resistant to downy mildew.
G. Fibre and Green Manuring Crops			
Jute Reshma	1995	25-30 q fibre/ha	Shining, long and strong fibre.
Jute-NDC-9102	2008	33-35 q fibre/ha	A capsularis variety, 27.51% superior over control (JRC-212), suitable for water-logged condition.
Jute – NDC-2008	2009	27 q. fibre/ha.	Maturity 160-170 days, suitable for waterlogged areas.
Crotolaria Narendra Sanai-1	2003	Seed 16-20 q & Biomass 300-350 q/ha	Maturity 130-135 days, lusturous black seeded variety, produces more number and weight of root nodules per plant, succulent stem. It adds 60-80 kg N/ha. Suitable for fibre, fuel and seed production. Well suited for normal and partially reclaimed saline-sodic soils.
H. Forage Crop			
Bajra-NDFB-2	2008	Seed 18-20 q, Green biomass 380-425 q/ha & dry matter 110-120 q/ha	Medium maturity, tall and erect plant type, broad dark green leaves, crude protein 8.2% and better quality characters, suitable for salt effected soils.
Oat- NDO &1	2009	500-534 q./ha Green Forage	Resistant to major diseases and pests, suitable for normal and salt affected soils, Crude protein yield 9-10 q/ha

Future Research Priorities :

- Thrust on sustainable agriculture with emphasis on increasing productivity in cropping system.
- Diversification of Agriculture with Animal Husbandry, Horticulture, Medicinal Plants, Sericulture, Fisheries and Apiculture.
- Improving soil health through use of Bio- fertilizers, organic manures, crop residues and inclusion of legumes in cropping systems.
- Developments of appropriate technologies including agricultural implements for efficient use of energy, water, soil and human labour.
- Emphasis on custom hiring of tractor operated fuel efficient, time saving, improved machinery to reduce drudgery and cost of cultivation
- Conservation of Biodiversity, Environment & Natural resources.
- Boost research on Biotechnology and Genetic Engineering and to Develop transgenic varieties.
- Research on Integrated Plant Nutrient Management (IPNM) and Integrated Pest Management (IPM).
- Emphasis on water conservation and management; to develop suitable varieties for rain-fed & irrigated ecosystems.
- Research on Post-harvest management of crops to avoid qualitative and quantitative losses in produce.
- Research on improving quality and value addition in view of GATS.
- Research on pesticides residue and its quantitative effects on crops, animal and human powers.
- Increasing and stabilizing yield through exploitation of genetic potential.
- Hi-tech horticulture and protected cultivation.
- Sustainable utilization of natural resources with environmental protection.
- Rationalization of cropping system through crop substitution and crop diversification.
- Safeguarding the plant biodiversity and Biotechnical advancements.
- Strengthening hybrids seed programme in agriculture in agriculture field and horticultural crops.
- Research in pulses and oilseeds and particularly in pigeon pea to be developed.
- Researches on sodic, floods and water logging affected soils to be strengthened in Eastern U.P.
- Ensuring food security.
- Birth control of blue-bulls.
- Development of modules for group farming.
- Technology for utilizing agro-industrial by products and waste as live-stocks feeds to be developed.
- Diversification of rice based cropping system.
- Buffaloes research to be strengthened. Corrective measures to be taken to check their infertility.
- Design, development, adoption and popularization of improvement farm equipments and technologies.
- Technology for paddy fish culture in flood prone areas.
- Agricultural Research Information System has to be strengthened in such a manner that it can meet the growing thrust of global needs of agricultural education and research.
- Integrated mechanization and post harvest technology.
- Information technology-Reaching the unreached.

Narendra Dhan-97



Narendra Dhan-2064

Narendra Sugandha Dhan

Narendra Shankar Dhan-2

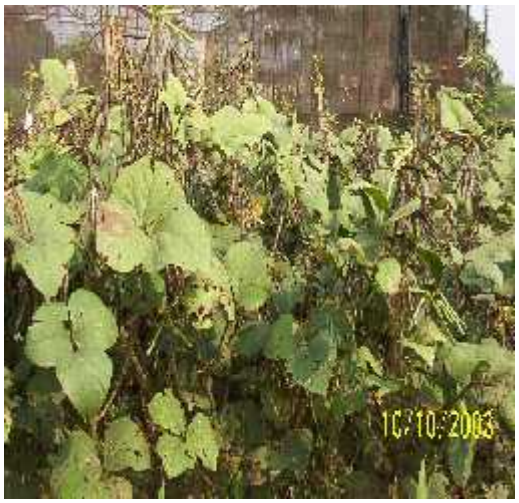
Swarna Sub-1

Narendra Usar Shankar Dhan-3

NDYR-8

Narendra Rai

Narendra Arhar-3



Narendra Moong-2

Narendra Masoor-1

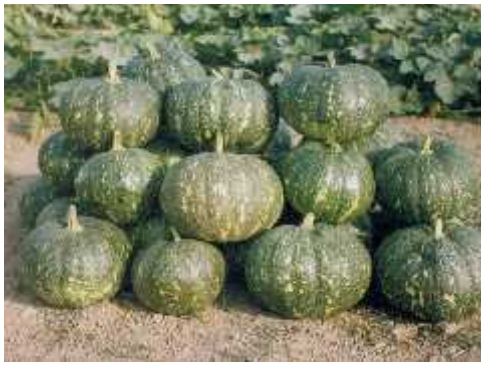
Narendra Masoor-2

BOTTLE GOURD

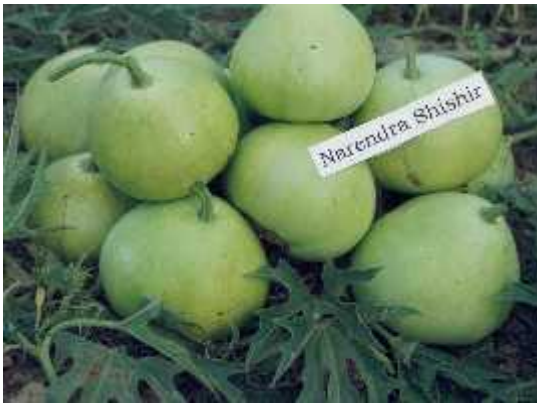
Bisexual flower of Andromon- 6

NDBGH-4

Andromon-6 green fruits



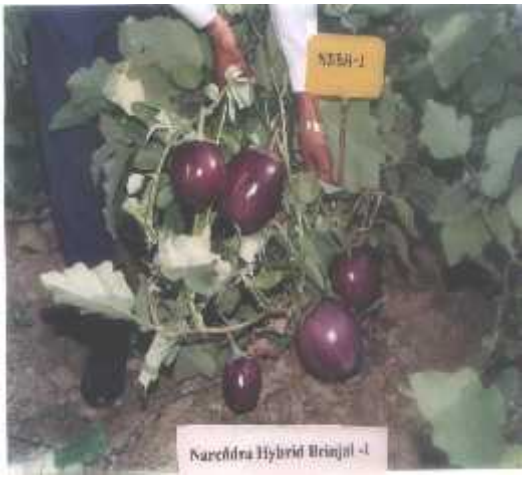
NARENDRA PUMPKIN HYBRID -1



Narendra Parwal-604

Narendra Karela Barahmasi-1

Narendra Tomato – 6

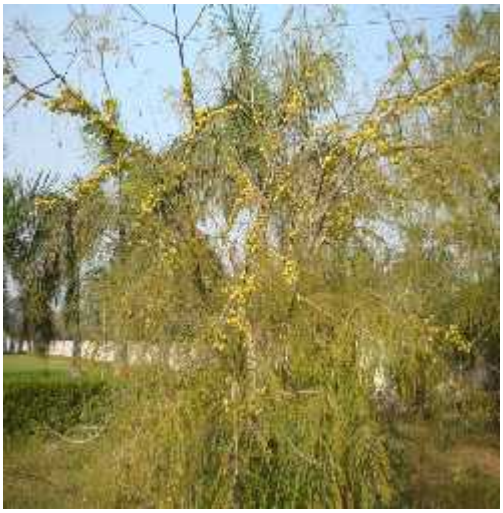


Narendra Hybrid Brinjal-1

Narendra Sabji Matar -1

NDA – 9

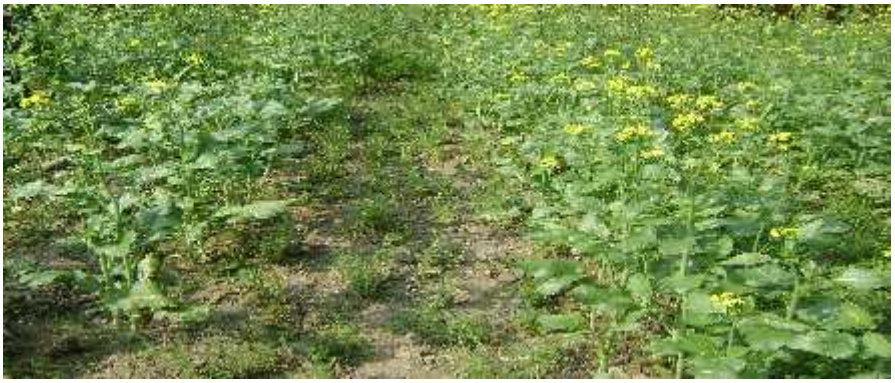
Narendra Aonla – 6



Narendra Aonla-10

Narendra Chara Bajra- 2

Narendra Jayee-1



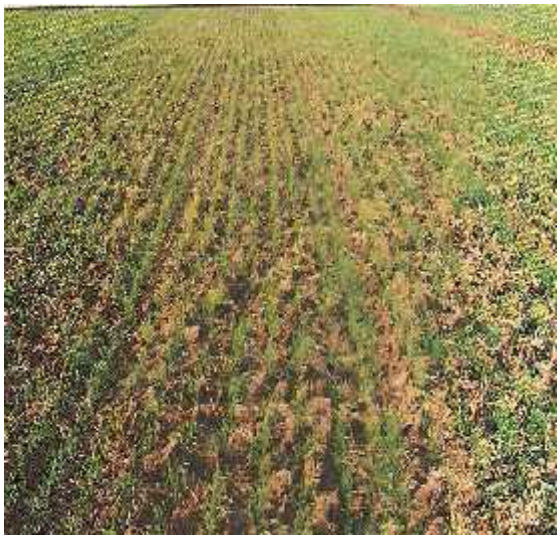
Intercropping of Gram + Mustard (4:1)

Intercropping of Gram + Sugarcane

Populus deltoides **based agri-silvicultural system (*P. deltoides* + *Triticum aestivum*) on sodic wasteland.**

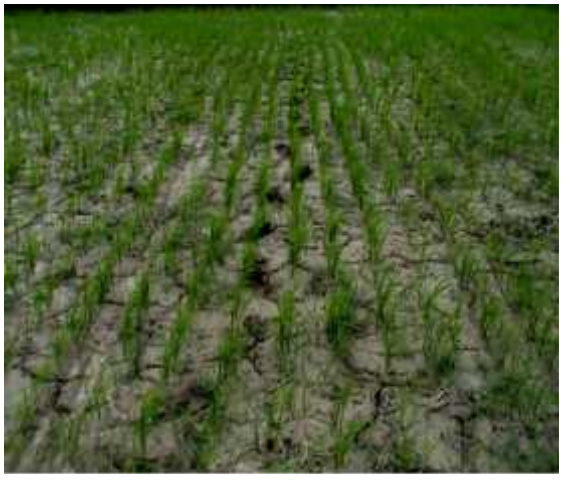
Mangifera indica- Emblica officinalis **based agri-sivi- horticultural system**

Wheat sowing by zero till drill



Wheat crop sown by zero till drill

Sowing with paddy drum seeder



Paddy crop sown with drum seeder

Milky mushroom (*Calocybe indica*)




Blue Oyster mushroom (*Hypsizygus ulmarius*)





White Oyster mushroom (*Pleurotus fossulatus*)