



**Acharya Narendra Deva University of  
Agriculture and Technology, Kumarganj,  
Ayodhya-224229**



## **Institutional distinctiveness: “Wasteland Management”**

The university has expertise in wasteland management to solve the problems of salinity and submergence of land. The university was established on wasteland in Kumarganj, Ayodhya (U.P.) with the aim to solve the problems of sodicity/salinity and submergence of land in eastern Uttar Pradesh. The university has established the distinguished technology to overcome these problems.

Wasteland attributes to various factors, including water logging, ravine and gully erosion, riverine lands, salinity and alkalinity, shifting and sand dunes, wind erosion, extreme moisture deficiency, overexploitation of natural resources, the accumulation of industrial and sewage wastes, soil erosion, and deforestation. The area of our country encompasses approximately 329 million hectares, of which 167 million hectares are affected by various forms of degradation, including water erosion, wind erosion, salinity and alkalinity, and flooding. Moreover, in Uttar Pradesh, about 1.8 million ha (6%) of the area is under fallow, which is either due to the lack of irrigation facilities or related problems of water logging, salinity/sodicity.

The university is distinguished for wasteland management under sodic and submerged conditions. Prior to establishing the university, vast area of sodic soil, had a pH, EC (ds/m), ESP, and Organic carbon percentage ranged from 10.4 to 10.6, 18.3 to 24.5, 76 to 84, and 0.08 to 0.16, respectively make agronomical practices impossible. The university has developed technologies to overcome the problems associated with salinity and submerged condition by continuous development of planting materials/varieties suitable for wasteland.



**Wasteland before Establishment of the University**

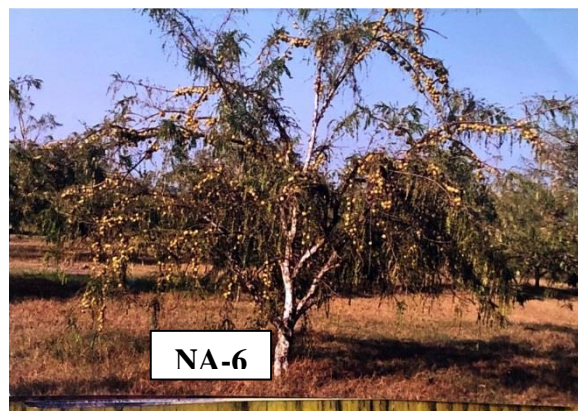
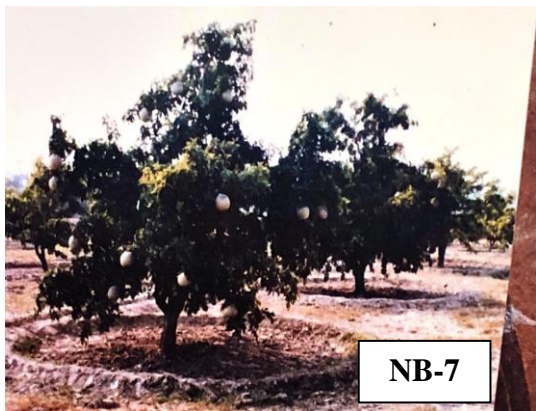


### University Established on Wasteland

Aonla (*Phyllanthus emblica*), Ber (*Ziziphus mauritiana*), Bael (*Aegle marmelos*) and Guava (*Psidium guajava*) orchards were established with intercropping system on 720 acres of sodic land in main campus as well as its surrounding areas. Improved and salt tolerant aonla, bael, ber, mahua orchards, rice, wheat, barley, bajra and oat varieties suitable for sodic soil has been developed and is popular among farmers.

**Table: Salt tolerant varieties of fruits and crops developed by the university**

S. No.	Fruit crop	Cultivars
1	Aonla	Krishna (NA-4), Kanchan (NA-5), NA-6, NA-7, NA-10, NA-25 and NA-26
2	Bael	NB-1, NB-5, NB-7, NB-8, NB-9, NB-10, NB-11, and NB-17
3	Ber	Narendra Ber selection-1, and Narendra Ber selection-2
4	Rice	Narendra Usar Dhan-2, Narendra Usar Dhan-3, Narendra Usar Sankar-3, and Narendra Usar Dhan-2008
5.	Wheat	Narendra Wheat-1076, Narendra Wheat-1067, Narendra Wheat-4018 and Narendra Wheat-5056
6.	Barley	Narendra Jau-1, Narendra Jau -2, Narendra Jau-3, Narendra Jau-4, Narendra Jau-5, Narendra Jau-6, Narendra Jau-7, and NDB-1465
7.	Bajara	Narendra Chara Bajra-2, Narendra Chara Bajra-3, NDFB-5 and NDFB-11
8.	Oat	Narendra Jayee-1, Narendra Jayee-2, NDO-10, NDO-711 and NDO-1101



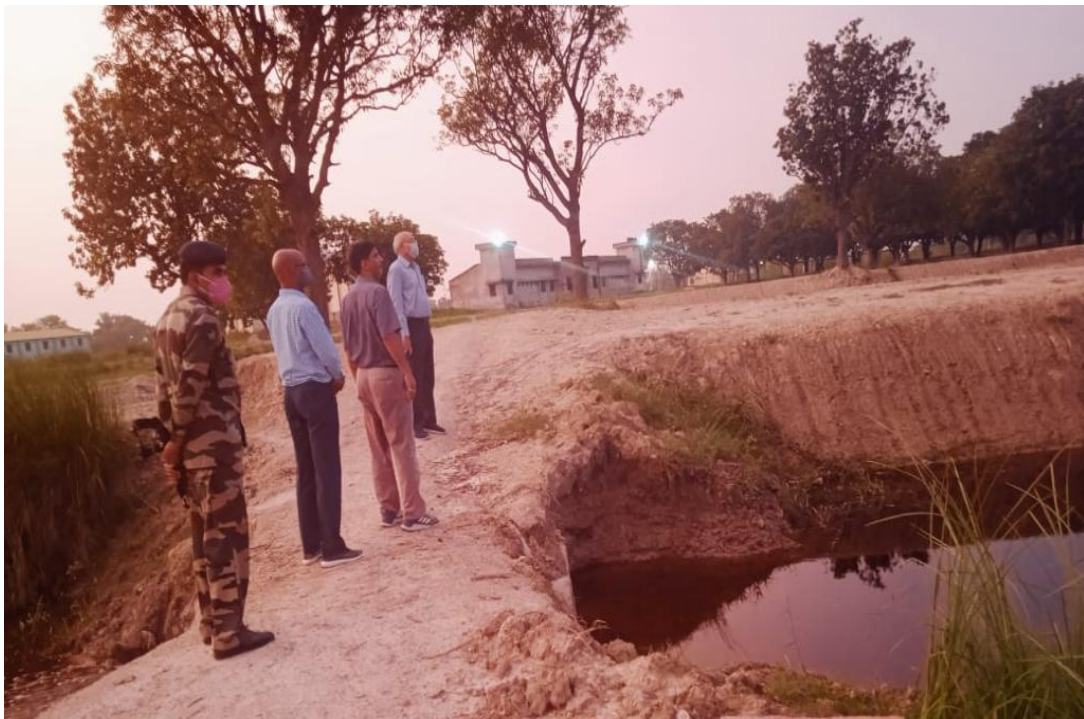
**Salt Tolerant Varieties of Bael and Aonla Developed on the Wasteland**



**Visit of the Team of Uttar Pradesh Bhumi Sudhar Nigam at the University Campus during 27-29 January, 1995**



**Three Days Training Programme on Wasteland Development Organized by the University (Sponsored by Uttar Pradesh Bhumi Sudhar Nigam) During 27-29 January, 1995**



**Wasteland of the University in 2019 before Reclamation**



**Wasteland of the University in 2019 before Reclamation**



**Reclaiming of Wasteland (8 ha)**



**Rice Crop Grown in Reclaimed Wasteland**

Eighty five percent Aonla cultivation area (nearly 98000 hectares) is covered by popular varieties (Narendra Aonla-4, 5, 6 and 7) developed by the university. Bael cultivation is dominated by Narendra Bael-5 and Narendra Bael-9 which cover more than 40% Bael cultivated area of our country.



**Orchards of Aonla, Bael, Ber and Jackfruit Grown on Reclaimed Land**

### **Rice ecology and varieties developed**

This is the only university in the country having all rice growing ecosystem. The university is working on rice improvement since its establishment and has released 43 rice varieties, better farm practices and technologies for enhancement of rice productivity in the country. The university accelerated climate change research and environmental sustainability, soil and water management also and improved commercial production of hybrid rice in India. The university has developed several varieties of rice adapted for different ecosystems. These include rainfed upland rice varieties (Narendra-1, Narendra-2, Narendra-97, Barani Deep and Shushka Samrat) of 90-110 days, irrigated mid early (Saket-4, Narendra-118 and Narendra Lalmati) of 110-120 days, irrigated ecosystem (Narendra-80, Sarjoo-52, Narendra-359, NDR-

2064, NDR-2065, Narendra Dhan-8002, Narendra Mayank, and Narendra Narayani) of 125-135 days, rainfed lowland ecosystem (Jalmagna, Jalnidhi, JalBhawani, NDGR-201, Chakia-59, Jalpriya, Madhukar, Barah Avarodhi and Jal Lahri), submerged ecosystem (Swama Sub-1, Sambha Sub-1, IR 64 Sub-1, NDR-9930077, NDR-9930017, NDGR-201, NDR-84183, NDR-9930111, NDGR-702 and NDR-9730018), problematic soil (NDR-9930077, Narendra Usar Dhan-2, Narendra Usar Dhan- 3, Narendra-359 and Narendra Sankar Usar Dhan-3). The university's rice varieties *viz.*, Sarjoo-52, NDR-97 NDR-2064, NDR-2065, and NDR-359 are being cultivated on more than 40% area of Eastern Uttar Pradesh and Bihar and Sarjoo-52 is most popular among rice varieties.



**Narendra Dhan-97**



**Narendra Dhan-2064**



**Narendra Sugandha Dhan**



**Narendra Shankar Dhan-2**



**Swarna Sub-1**



**Narendra Usar Shankar Dhan-3**

**Rice Varieties Released by University**



**Performance of Rice Variety (Jal Lahari) in Deep Water**



**Submergence Rice Varietys (Swarna Sub-1)**

The university is also working on improvement of Kalanamak for high yielding, short stature, and tolerance to biotic and abiotic stresses with strong aroma and nutritional quality with the help of state and nationally funded projects. Recently, the university has released two improved Kalanamak varieties, viz., “Pusa Narendra Kalanamak-1” and “Pusa Narendra



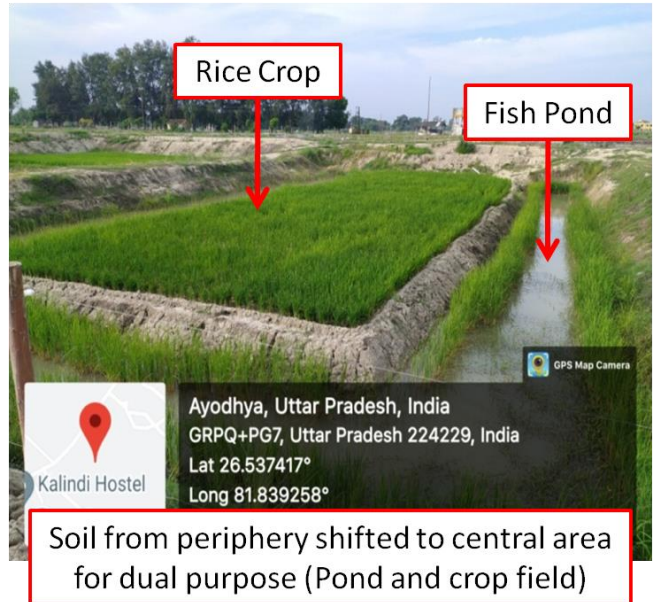
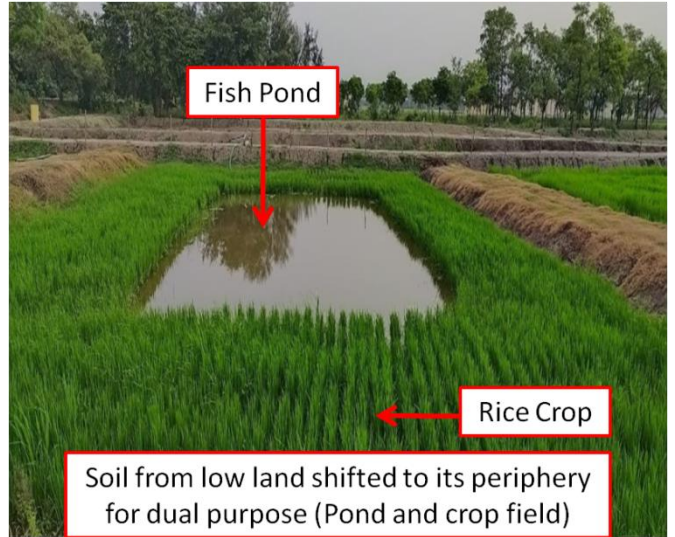
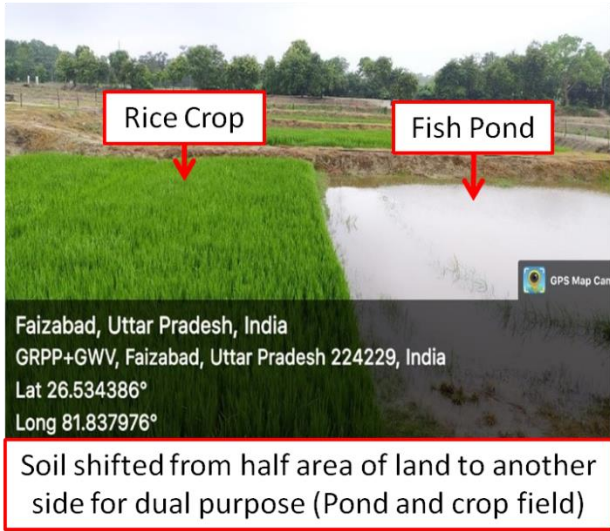
Kalanamak CRD-2” which can be helpful for Indian government in achieving the target of rice exports of 400 million US Dollar. The university is also working to supplement the poor people diet by rice fortification with micronutrients like iron, zinc and pro-vitamin-A.



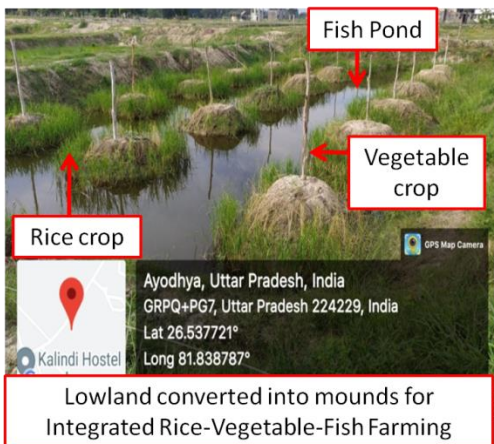
**Monitoring of Kalanamak Experiment**

### **Integrated Farming**

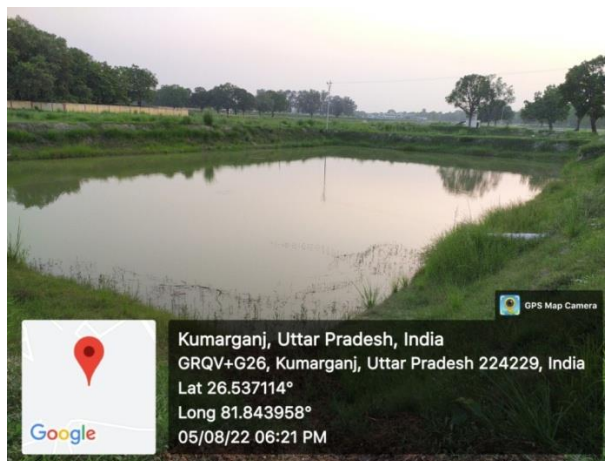
India is abode of 11.6 M ha water logged area which is major potential resource of diversified agricultural practices. Ecology of water logging condition is divergent, tangled and fragile due to various kinds of a biotic and environmental stresses such as exposure to excess water, flash flood and draught. The university has utilized a large area of wasteland especially low land for establishing the integrated farming system. Integrated Rice-Fish and Rice-Vegetable-Fish farming system has been successfully established at Instructional Fish Farm to utilize water logged wasteland characterized by sodic soil. Under integrated farming, the vegetable crops (snake gourd, smooth gourd, ridge gourd and asparagus bean), rice crop (Sarjoo-52) and fish has been grown. Multi-layer farming has been established to utilize maximum area by using vertical space above the land.



### Integrated Rice-Fish Farming



### Integrated Rice-Vegetable-Fish Farming



**Fish Ponds Developed on Wasteland**

### **Natural and Organic Farming (on Agronomy Farm) Developed on Wasteland**

The university has established a model of inorganic fertilizer and chemical-free “Natural/Organic” farming system. An agro-ecology based diversified farming system integrates crops, trees and livestock with functional biodiversity. It is backed by our rich traditional knowledge, and is a practice of agriculture based on locally available resources, which makes it a sustainable and viable practice.



**Natural and Organic Farming at the University Farm**

### **Salt Tolerant Wheat Varieties**

Development of salt tolerant wheat varieties is the permanent solution to utilize the wasteland for crop production which is sustainable and eco-friendly as compared to management practices. The university has developed high yielding salt tolerant wheat varieties viz., NW-1067, NW-1076, NW-4018 and NW-5054 performing well in salt affected soils.



### **High Yielding Salt Tolerant Wheat Varieties (NW-1076, NW 1067 and NW-5054)**

#### **Salt Tolerant Barley Varieties**

The university has developed barely varieties suitable for salinity conditions viz., Narendra Barley-1, Narendra Barley-2, Narendra Barley-3, Narendra Barley-4, Narendra Barley-1173, NDB-943, NDB-1445, NDB-1465 and NDB-1464. These varieties also have industrial importance (production of malt, beer etc.).



**Barely Varieties (Narendra Barley-1, Narendra Barley -2, Narendra Barley-5, NDB-1465)  
Suitable for Salinity Conditions Developed by the University**

**Salt Tolerant Bajra and Oat Varieties**

The university has also developed forage Bajra and Oat varieties most suitable for salt affected areas. Bajra varieties are NDFB-2, NDFB-4, NDFB-5 and NDFB-11. Oat forage varieties are NDO-1, NDO-2, NDO-11 and NDO-1101



**Bajra Variety (NDFB-2) Suitable for Salt Affected Areas**



**Oat Varieties (Narendra Jayee-1 and Narendra Jayee-2) Suitable for Salt Affected Areas**

#### **Development of NSP-6 on wasteland**

In continuation of wasteland management, the university has worked on National Seed Project (NSP) and developed the NSP-6 in 2020 with the aim of quality seed production. In this project, a total of 12.10 hectare undulated sodic wasteland has been transformed into productive

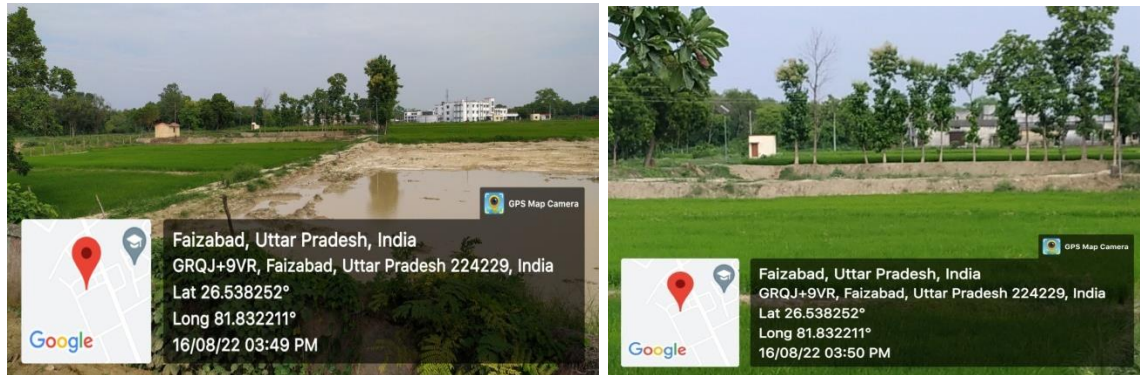
land. NSP-6 has four rain water harvesting-cum-fish ponds and the remaining developed areas are being used for crop production. The inputs utilized for the development of the wastelands were gypsum, paddy straw, farm yard manure (FYM) vermi-compost, jeevamrat etc. At present, various crops viz., rice, wheat, barley, oat etc. are being cultivated for seed production and fish production from the developed ponds on NSP-6. In 2021, a total of 3.20 hectare area of wasteland was also developed for wheat and barley research farms. In 2022, a total of 2.80 hectare area of wasteland was reclaimed and is under the process for the plantation (horticultural crops).



**NSP-6 developed on wasteland**

## Development of Technology Park

An area of 3.5 hectare has been reclaimed for establishment of Technology Park. Under this, a fish pond has been developed and the remaining land reclaimed for crop production.



## Technology Park Developed on Wasteland, Near Gate No.1 of the University

### Consultancy on wasteland management

The university has provided consultancy on wasteland management to Uttar Pradesh Bhumi Sudhar Nigam (UPBSN) and State Horticulture Department which resulted into plantation of Aonla, Bael, Guava, and Ber on an area of 25000 acre of sodic land.