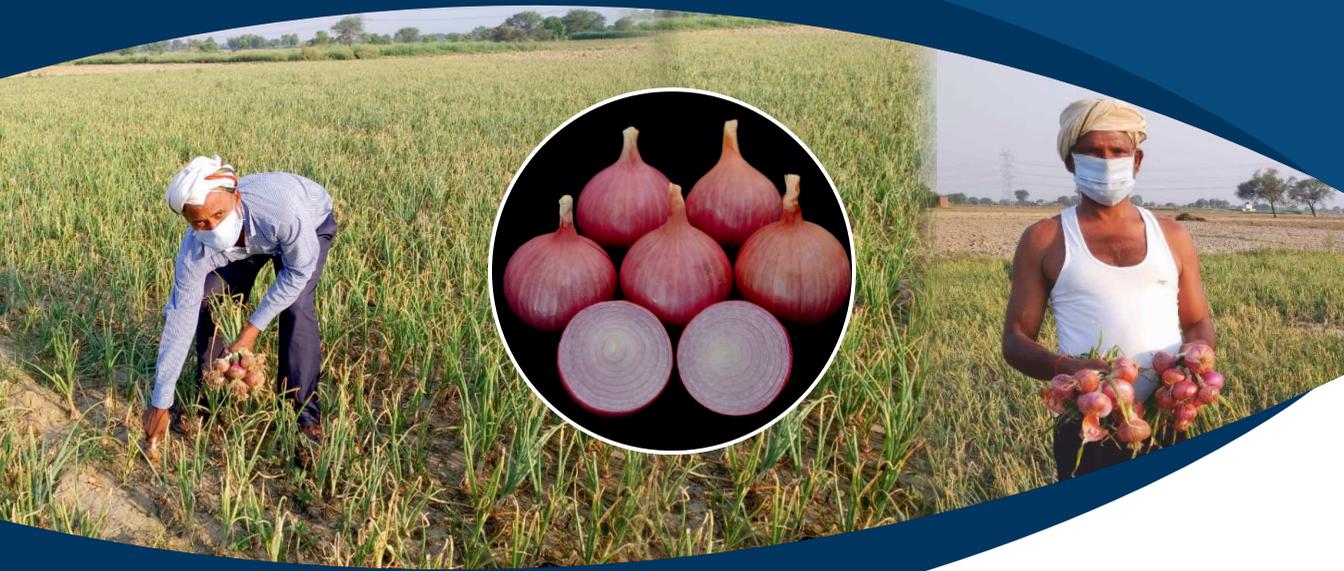


Extending commercial cultivation of onion in eastern parts of Uttar Pradesh: A success story



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Onion is an important commercial crop which can improve livelihood of small and marginal farmers. It also plays a crucial role in food and nutritional security. ICAR-Directorate of Onion and Garlic Research has developed ten onion varieties and two garlic varieties as well as production, protection and post-harvest technologies to improve onion and garlic cultivation in India. Adoption of these improved technologies enabled farmers to improve the productivity of onion and farm income. The extension work was initiated by ICAR-DOGR for popularization of improved onion varieties and production technologies in different parts of the country in collaboration with Krishi Vigyan Kendra's (KVKs), Non Govt. Organisations (NGOs), Farmer Producer Organisations (FPOs) and ICAR Institutes with the support of Tribal Sub Plan (TSP), Scheduled Cast Sub Plan (SCSP) and Institute activities for livelihood improvement of the farmers through commercial cultivation of onion and garlic.

About Mirzapur

Mirzapur district lies in the South-Eastern part of Uttar Pradesh. With an area of 4,50,169 ha and population of more than 20 lakh, the district is divided in 4 sub-division, 12 blocks and 1698 villages. Agro-climatically, the district falls under two zones, viz. Indo-Gangetic Plains covering only 30-40% of the total area and Vindhyan Zone covering remaining area. The area under Gangetic Plains is endowed with rich alluvial and fertile soil and good irrigation facilities while the Vindhyan Zone has meagre resource of water and the land is mostly degraded. Most of this area follows rice-wheat cropping sequence, but other major crops including vegetables are also grown. The climate is semi-arid with an annual rainfall of 978 mm. Out of this, 85-90% is received during monsoon (4th week of June to end of Sept.) and the rest has unreliable post monsoon and winter showers.

Though, the south-eastern part of Uttar Pradesh especially Mirzapur has congenial climatic conditions for onion production at commercial level, the cultivation of onion was limited to only *rabi* season at small level, mostly for kitchen gardens. There is tremendous scope to cultivate onion during *kharif* at commercial level to achieve more profit than *rabi* season and other traditionally growing vegetables. The farmers of Mirzapur district generally cultivates local varieties of onion which have poor productivity. As the quality of onion bulbs of these varieties is also poor, they get less profit. Therefore, it was decided to promote onion varieties and other production technologies of ICAR-DOGR in Mirzapur district of Uttar Pradesh.

Importance of *Kharif* Onion Production

Kharif onion plays a very important role in bridging the critical gap of demand and supply from November to February throughout the country when price of onion shoots up a level and becomes a serious concern for food supply. About 50-60% of onion comes from *rabi* and 20-25% each from *kharif* and late *kharif* seasons. The *kharif* onion mainly grown in Maharashtra, Karnataka, Rajasthan, Haryana, Bihar and Tamil Nadu. The *kharif* production is highly vulnerable to erratic monsoon, cloudy weather, continuous drizzling which creates the problem of foliar as well as soil-borne diseases. If *kharif* crop is delayed or spoiled due to whimsy monsoon, prices increases very rapidly in October and remains high till January-February; therefore *kharif* crop is most crucial in controlling market prices. For enhancing the productivity of *kharif* onion through transplanting, ICAR-DOGR has developed onion varieties viz. Bhima Super, Bhima Dark Red, Bhima Red, Bhima Raj, Bhima Shubhra and Bhima Safed as well as “*Kharif* Onion Production Technology” which are helping to enhance the productivity.

For ensuring round the year supply of onion to minimise price volatility, emphasis should be given on enhancing the area during *kharif* season in potential pockets of non-traditional areas. Since, there is a great scope for growing onion in non-traditional areas including south-eastern parts of UP and north-eastern states, it need to be encouraged. This measure provides insurance against weather-related aberrations and crop failures. Further, protecting the crop against vagaries of climate, pest and diseases becomes top priority.

Survey, Awareness and Training

ICAR-DOGR collaborated with Seva International, Kashi and Gautam Kalloo Research and Development Foundation, Varanasi in 2017 for conducting survey, awareness programmes, trainings, demonstrations and input distribution for cultivation and seed production of onion and garlic to provide a source of livelihood to the farming community. In 2019, ICAR-DOGR has also collaborated with Agrimitra Farmers Producer Company Ltd., Mirzapur to boost up the extending commercial cultivation of onion and garlic in eastern parts of UP.

The systematic efforts were taken to improve the area and production of onion in *kharif* as well as *rabi* with careful application of improved varieties and recommended production technologies. The focus was given on conduction of field demonstrations of improved technologies at farmers' fields through improved varieties, knowledge dissemination, capacity building and entrepreneurship development.

Initially, few interaction meetings were conducted with progressive farmers in collaboration with Seva International, Kashi and GK Research Development Foundation, Varanasi. Onion Awareness Camp was organized on 12 December, 2017 under the chairmanship of Dr. Major Singh, Director, ICAR-DOGR to create awareness and enhance the knowledge level of farmers to adopt new technologies of onion production in Mirzapur, Varanasi, Ghazipur, Ballia and other adjoining areas.

Onion cultivation was not yet commercialized in large areas of Mirzapur, Varanasi, Ghazipur and Ballia due to lack of awareness among the farmers about its high yielding varieties, improved production and post-harvest technologies. Hence, total six trainings on different topics such as onion awareness camp, onion nursery management, improved cultivation of onion, *kharif* onion production technology, raising of early *kharif* onion through sets technology and quality seed production of onion were conducted to create awareness about improved onion cultivation practices among the farmers of this area (Table 1). These trainings were attended by about 330 farmers from 26 villages including Gangpur, Bagahi, Jalalpur, Sahaspura, Pratappur, Keshavpur, Dharampur, Kailhat, Shivajipuram, Nakahara, Shivrajpur and Govindpur of Chunar taluka, Mirzapur (UP).

Table 1. Training-cum-awareness programme organized in Mirzapur (UP)

Date	Topic of training	Beneficiaries of trainings
12 December, 2017	Onion Awareness Camp	50
2 June, 2018	<i>Kharif</i> onion production technology	50
10 March, 2019	<i>Kharif</i> onion production technology	40
10 June, 2019	Raising of early <i>kharif</i> onion through sets technology	60
23 November, 2019	Improved cultivation of onion	60
17 October, 2020	Quality seed production in onion	70



Onion awareness camp on 12 December, 2017



Training on *kharif* onion production technology on 2 June, 2018



Training on *kharif* onion production technology on 10 March, 2019



Training on raising of early *kharif* through sets on 10 June, 2019



Training on improved cultivation of onion on 23 Nov, 2019



Training on quality seed production of onion and garlic on 17 Oct, 2020

Year-wise Demonstrations and Results

Field demonstrations are the effective means to facilitate dissemination and adoption of farm innovations and other practical information among the farmers. These are based on the principle of 'seeing is believing'. Thus, the recommended package of practices along with improved varieties was demonstrated especially on onion cultivation in selected belts of Mirzapur.

Total 305 field demonstrations on onion cultivation were conducted in *kharif* and *rabi*

seasons in Mirzapur district (Table 2). About 300 progressive farmers were selected from 26 villages including Bagheri, Ramrayanpur, Yamattapur Khurd, Chandapur, Bhawanipur, Gangpur, Dharampur, Govindpur, Ramjipur, Partappur, Parshodha, Bela, Bagahi, Fatehpur, Kailahat, Darban, Chilarha, Baraulia, Shivrajpur, Dixitpur, Keshavpur, Jalalpur Mafi, Nakaraha, Raipuria, Sahaspura, Shivajipuram of Chunar taluka, Mirzapur (UP). For the first time, *kharif* onion production was initiated at commercial level in Chunar taluka of Mirzapur. A total of 225 demonstrations on newly improved onion varieties and improved production technologies were carried out during *kharif* 2018-19 to 2020-21. Similarly, 80 demonstrations were conducted on *rabi* onion cultivation.

Table 2. Field demonstration on cultivation of onion in Mirzapur (UP)

Year and season	Activities	Varieties	No. of Demos	Seed distributed (kg)	No. of Beneficiaries
2018-19 (<i>Kharif</i>)	Cultivation of onion during <i>kharif</i>	Bhima Super and Bhima Dark Red	20	40*	20
2018-19 (<i>Rabi</i>)	Cultivation of onion during <i>rabi</i>	Bhima Shakti	20	40	20
2019-20 (<i>Kharif</i>)	Cultivation of onion during <i>kharif</i>	Bhima Super and Bhima Dark Red	50	100**	50
	Raising early <i>kharif</i> onion through sets	Bhima Dark Red	20	250	20
2019-20 (<i>Rabi</i>)	Cultivation of onion during <i>rabi</i>	Bhima Kiran	30	60	30
2020-21 (<i>Kharif</i>)	Cultivation of onion during <i>kharif</i>	Bhima Super	135	250	135
2020-21 (<i>Rabi</i>)	Cultivation of onion during <i>rabi</i>	Bhima Shakti	27	50	27
	Quality seed production in onion	Bhima Shakti	3	400	3

* 20 kg of each variety, ** 50 kg of each variety

a. Performance during *kharif* season

During *kharif* 2019-20, total 50 demonstrations on *kharif* onion production were conducted. Even in the adverse climactic condition due to heavy rainfall, farmers gained more income than their expectations. Demonstrations on raising early *kharif* onion through sets performed well but some of the demonstrations failed due to heavy rainfall.

Farmers have earned a net income of Rs. 0.70-0.80 lakh per acre through production of onion bulbs about 80-100 q from Bhima Super and Bhima Dark Red variety during *kharif* 2018-19 whereas during *kharif* 2019-20, farmers got a net income of Rs. 2.0-2.5 lakh per acre by producing about 70-80 q onion bulbs of varieties *viz.*, Bhima Super and Bhima Dark Red (Table 3).

Table 3. Performance of onion production by selected farmers during *kharif* 2019-20

Name of farmer	Onion varieties	Yield/ Acre (q)	Rate of sold onion bulbs (Rs./kg)	Benefit gain (Rs./Acre)
Mr. Santosh Kumar Singh Village- Jalalpur Mafi, Chunar, Mirzapur (UP)	Bhima Dark Red	48.57	56.7	2,55,238/-
Mr. Manoj Kumar Singh Village- Jalalpur Mafi, Chunar, Mirzapur (UP)	Bhima Dark Red	50.79	44.0	2,03,587/-
Mr. Virendra Kumar Village- Jalalpur Mafi, Chunar, Mirzapur (UP)	Bhima Dark Red	87.30	57.3	4,80,325/-
Mr. Dilip Kumar Singh Village- Jalalpur Mafi, Chunar, Mirzapur (UP)	Bhima Dark Red	93.60	36.0	3,07,270/-
Mrs. Geeta Devi Village- Bagahi, Chunar, Mirzapur (UP)	Bhima Super	59.37	58.5	3,27,111/-

Most of the farmers from selected villages have started to cultivate onion crop on commercial scale as they have seen the profit gained by farmers through demonstration areas. They are also ready to replace their traditional crop groundnut

for *kharif* onion. Previously these farmers were producing groundnut which yield up to 9 q per acre and get price of Rs. 32-35/- per kg. Thus, they get maximum profit of Rs. 21000/- per acre. As per farmers' opinion, *kharif* onion is 3-4 times more profitable than traditionally grown groundnut. The onion farmers are also enjoying unexpected income through *kharif* onion cultivation due to hike of onion price in the market as well as drastic decrease in onion production due to erratic rainfall causing water stagnation in the fields during current *kharif* season. The farmers sold their onion at Rs. 40-60 per kg and got the income up to 4.80 lakh per acre.

Mr. Virendra Kumar from Jalalpur Mafi, Chunar, Mirzapur (UP) raised onion bulb crop as per ICAR-DOGR recommended technology and produced 87 q per acre marketable bulb yield. He earned net income of Rs. 4.80 lakh per acre as his onion bulbs were sold at the rate of Rs. 57 per kg in the market whereas one lady farmer Mrs. Geeta Devi from Bagahi, Chunar, Mirzapur (UP) produced 59 q per acre onion bulbs by following ICAR-DOGR recommendations and earned Rs. 3.27 lakh net income. Her onion bulbs were sold at the rate of Rs. 58 per kg during *kharif* 2019-20.





Performance of *kharif* onion crop at farmers' fields during 2019-20

b. Performance during *rabi* season

A total of 80 field demonstrations on onion cultivation of newly released varieties Bhima Shakti and Bhima Kiran with improved production technologies were conducted during *rabi* 2018-19 to 2020-21 in Mirzapur (UP). Thirty progressive farmers (6 from each village) were selected from five villages viz.; Gangpur, Bagahi, Jalalpur, Govindpur and Shahaspura of Narayanpur block of Mirzapur district (UP) with the support of Agrimitra Farmer Producer Company, Mirzapur. For the first time, *rabi* onion production was initiated at commercial level in Narayanpur block of Mirzapur.

Farmers have earned a net income of Rs. 41,000-51,000/- per acre through production of onion bulbs about 66-71 q per acre from Bhima Kiran variety even in national lockdown situation due to COVID-19. Mr. Shambhu Sahani from Govindpur, Chunar, Mirzapur (UP) raised onion bulb crop as per ICAR-DOGR recommended technology and produced 71 q per acre marketable bulb yield. He earned net income of Rs. 51,000/- per acre as his onion bulbs were sold at the rate of Rs. 10/- per kg in the local market whereas, another farmer Arvind Kumar from Gangpur, Chunar, Mirzapur (UP) produced 66 q per acre onion bulbs by following ICAR-DOGR recommendations and earned Rs. 41,000/- net income. His onion bulbs were sold at the rate of Rs. 9/- per kg even in national lockdown situation due to novel corona virus.

Farmers might have received more profit if national lockdown was not induced during March-May 2020. However, most of the farmers from selected villages have

started to cultivate onion crop on commercial scale as they have seen the profit gained by the farmers in demonstration areas. It shows that the eastern part of Uttar Pradesh is potential area for both *kharif* and *rabi* onion production.



Performance of *rabi* onion crop at farmers' fields during 2019-20
(during national lockdown situation in month of May 2020)

Area Expansion of Onion

Demonstrations on onion production have been conducted successfully by ICAR-DOGR in 300 acres in selected areas of Mirzapur which can be extended in Rajgadh and Shikhar block of Mirzapur as well as adjoining districts of Sonbhadra, Varanasi and Chandauli to fulfil the onion requirement during October to February.

Impact assessment of the interventions was carried out to evaluate change in onion production, productivity and profitability as well as knowledge of farmers. The production and productivity of onion in Mirzapur has been increased by 93% and 32%, respectively after intervention of ICAR-DOGR in collaboration with Agrimitra Farmers Producer Company Ltd., Mirzapur and G K Research & Development

Foundation, Varanasi. **The area under onion cultivation in Mirzapur district increased from 352 ha (2016-17) to 515 ha (2018-19) whereas production of onion increased from 4887 t (2016-17) to 9414 t (2018-19). Productivity of onion has been increased from 13.8 t/ha (2012-13) to 18.3 t/ha (2018-19) (Source: Dept. of Agriculture, Govt. of Uttar Pradesh).**

It has further expanded in more areas of eastern Uttar Pradesh. The most of the area expansion was in *kharif* season due to high profitability. Though traditionally in the eastern UP *rabi* onion was more popular but with the intervention of ICAR-DOGR the area under *kharif* season has been expanded.

Scope for Future Intervention

There is good scope for cultivation of *kharif* and *rabi* onion in Mirzapur, Varanasi, Chandauli, Sonbhadra and other adjoining areas of Uttar Pradesh. The demonstrations led to conclusion that the eastern part of Uttar Pradesh is suitable for *kharif* onion production. To extend onion production technology in these pockets of the country to solve the issue of onion price fluctuation during the months of October to November, it requires continuous efforts through-

- Popularization of the improved onion varieties through demonstrations in potential areas for *kharif* and *rabi* season
- Capacity building of the farmers and extension functionaries
- Ensuring the availability and accessibility seeds of improved varieties to the farmers
- Support of local extension functionaries for popularizing the improved onion technologies
- Formation of farmer producer companies for strengthening value chain of the onion

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