

## **Technical enhancement for potato productivity**

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### **Abstract**

*Potato is one of the most important vegetable crops in India and Agra district of Uttar Pradesh is leading district in its area and production in the state but the poor productivity is major cause of concern. Wide technological gaps in adoption of improved production technologies and other socio economic factors led to low potato productivity in India. Being the important vegetable crop in India, a sound research and extension programme is being under operation in many of potato growing areas. The demonstration of improved package of practice in terms of comprehensive nutrient management including the micro nutrients and integration of organic and inorganic nutrient sources result in enhance potato productivity. The other factor of production like efficient irrigation scheduling, integrated weed management and plant protection and more importantly use of improved high yielding, stress (biotic and abiotic) tolerant newly released varieties are some other crucial demonstrable technologies to realise high potato productivity. Improved potato varieties are one of the most important factor, results in maximum increase in productivity. The improved technologies are being successfully disseminated among the farmers through front line demonstration. Active participation of farmers with subject matter experts in demonstrating improved agro techniques at the farmers' fields will definitely increase potato tuber yield to higher level.*

*In this background, the KVK, RBS College, Bichpuri, Agra conducted Frontline Demonstrations (FLD) on improved agricultural technologies of potato crops in scientific manner at farmers' fields during the year 2004-05 and 2005-06. From the results of FLD's, It could be concluded that the existing vast extension and technological gap can be packed to a large extent through the front line demonstration and by showing the scope of potato productivity enhancement at farmer's field and resulted in enlightening the knowledge of the farmers. The study clearly revealed that demonstration at farmer's field resulted in more knowledge of improved package of practices among the farmers. More number of framers can be benefitted by conducting need based frontline demonstration, which ultimately result in increasing overall production of potato in the state and bring food security.*

Key words: *Agro techniques, FLD, productivity*

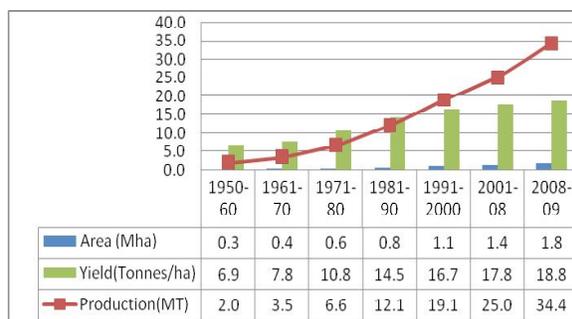
### **Introduction**

Potato crop represents nearly half of the worlds annual output of all root and tuber crops. In terms of acreage, potato crop is the world's 4<sup>th</sup> vital staple food crop after wheat, rice and maize and have great yield potential and high nutritive value. Potato is an economically important staple crop in both developed and developing countries, having an annual global production of about 300 million tonnes. The top ten producers in the world are China, Russia, USA, Ukraine, Poland, Germany, Belarus, Netherlands and France, which together contribute about 70% of the total global production. India ranks third contributing around 7.5% to the world's production. Since 1950's the area, production and productivity of potato in India had increased 853, 1748 and 173 percentage and 6.8,

18.5 and 2.7 times (Table 1). The production of potato tubers increased manifold in India, this jump in production is attributed mainly to increase in productivity of potato which is presently 18.8 tonnes/ha compared to 2.0 tonnes/ha in 1950 (Figure 1). Uttar Pradesh is the leading state with area, production and productivity of 0.53 Mha, 10.8 MT and 20.5 tonnes/ha in the country which is closely followed by West Bengal, however the maximum potato productivity is from Punjab and West Bengal (24.7 tonnes/ha).

These are remarkable change in potato statistics in our country and also depict increasing importance in human diet. Still the achievable gap in potato productivity is enormous. The achievable yield of potato productivity is up to 40 tonnes/ha and the

productivity of potato in India is only 18.8 tonnes/ha. Thus the extension of improved package of practices including the latest improved varieties is very important in realisation of genetic yield potential of potato. The demonstrations of advanced improved potato production technologies at village level can suitably fill the gap in the productivity. In India, most of the farmers are of small and marginal category and have limited resources and surplus family labour. This makes technological up-gradation of agriculture-based enterprises imperative. Keeping the importance of potato crop in Agra, the KVK, Agra conducted Frontline Demonstrations on improved agricultural technologies of potato crop in scientific manner at farmers' fields during the year 2004-5 and 2005-06.



## Methodology

Farmers of operational area of Krishi Vigyan Kendra (K V K), Agra were selected as per guideline of Front Line Demonstrations to KVK by Zonal Coordinator of Zone IV. Accordingly, the FLDs under potato crop were conducted in six villages; namely, Nagar, Nagala Gujra, Nagala Bhalra and Anguthi. The knowledge level of the farmers in these four villages was also estimated by taking random sample of 25 farmers from each village. Thereby sample included 100 numbers of farmers in the study. The farmers were asked to reply questions about the improved agro techniques including the high yielding varieties of potato. The scores so obtained under various questions were summed up. On the basis of the total score obtained, respondents were categorized into three classes' i.e. low, medium and high level of knowledge.

The participating farmers were provided with all advance technical know how about sustainable cultivation of potato. Also KVK scientists visited regularly the demonstration fields and continuously guide the farmers. These visits were also utilized for collection of feedback information for more improvement in technology transfer programmes. Field days and group meetings were also organized at the demonstration sites to provide the opportunities for other farmers to witness the benefits of demonstrated

technologies. The data on potato productivity (q/ha) were collected from the demonstration and control plots (farmers practice) for further analysis. The critical inputs were duly supplied to the farmers by the KVK. Data were collected from the fields of FLDs farmers and analysed to compare the yields of farmers' fields and FLDs fields. The technology gap, extension gap and the technology index were estimated by the formulae provided by Samui et al, 2000.

Technology gap = potential yield - demonstration yield

Extension gap = demonstration yield - farmers yield

Technology index

$$= \frac{(\text{potential yield} - \text{demonstration yield})}{\text{Potential yield}} \times 100$$

Potential yield

Frontline Demonstrations on improved agricultural technologies of nutrient management and improved varieties of potato was carried out in scientific manner at farmers' fields during the year 2004-05 and 2005-06.

## Results and discussion

(A). Knowledge level of advanced agronomic practices of potato cultivation

To know the need of the technological intervention the knowledge level of the farmers in four villages were estimated from 100 farmers 25 from each village. The score range for low, medium and high was fixed as 28-45, 46—62 and 63-79 respectively. The findings are in agreement with the findings by Dube and Sawarkar (1992) and Munir et al., 2009, who reported that majority of farmers, had medium level to high level of knowledge. Over all maximum number of farmers fall in the category of medium knowledge level, while very few were with high knowledge level (Table 2). Thus need was felt to introduce latest varieties and nutrient management in front line demonstration programme in the four villages. FLD is good extension tool to demonstrated impact of new agro techniques to the farmers.

(B) Front Line Demonstration on potato:

Frontline demonstrations were undertaken for integrated nutrient management including organic and

Table 1: Area, production and productivity trend in potato production on long term basis

Year	Area ('000 ha)	Production ('000 t)	Yield (q/ha)
1949-50	234	1543	65.9
2004-05	1600	28500	180.0
% increase	583.7	1748.0	173.0
Increase (time)	6.8	18.5	2.7

Based on Agricultural Statistics at a glance 2007-08

Table 2: Overall knowledge level of farmers in respect of improved package of practices of potato cultivation.  
 N = 100

S.No.	Category of knowledge level	Score range	Number of farmers	Percentage of respondents
1	Low	28-45	18	18
2	Medium	46-62	45	45
3	High	63-79	37	37

Table 3: Demonstration on improved nutrient management of potato cultivation at Nagala guraja village during 2004-05 and 2005-06

Components of FLD	Variety	No. of Demonstrations	Area (ha)	Productivity (q/ha) ±SE	Increase in productivity (%)	Technology gap	Extension gap	Technology index
RDF(100% NPK)	Kufri Pukhraj	4	2.0	328±15	29	27	73	8
50% RDF+FYM (5t/ha)	Kufri Pukhraj	4	2.0	335±11	31	20	80	6
FYM (10 t/ha)	Kufri Pukhraj	4	2.0	310±18	22	45	55	13
Control	Kufri Pukhraj	2	1.0	255±20	-	100	-	28
Potential yield with all inputs				355±12				

inorganic nutrient sources and another FLD's were carried out for improved varieties. The results of these FLD's, conducted during *rabi* 2004-05 and 2005-06 are presented herewith.

*Front Line Demonstration on improved nutrient management on potato productivity:*

Front line demonstration on nutrient management were conducted with 100 % nutrient supply through as recommended fertilizer dose through chemical fertilizers, Integrated Nutrient Management of 50% RDF +FYM (5t/ha) and organic nutrient management through FYM (10 t/ha) and no nutrient supply under control conditions, respectively during 2004-05 and 2005-06 at Nagala Gujara village. The maximum increase in productivity was recorded in integrated

nutrient management of 50 % nutrient supply through FYM and 50 % through chemical fertilizer, though it was comparable with the potato productivity under recommended dose of fertilizer only through chemical fertilizer (Table 3). Farmers' feed backs were also positive about effect of nutrient sources on quantity and quality of potato under integrated nutrient source. The technology gap in RDF (100% NPK), 50% RDF +FYM (5t/ha), FYM (10 t/ha) and was estimated as 27, 20, 45 and 100 q/ha, whereas average extension gap was observed 70 q/ha in RDF (100% NPK), 50% RDF +FYM (5t/ha), FYM (10 t/ha). This explained the importance of extension techniques to convince the farmers about the improved agro techniques for enhancing the potato productivity.

Table 4: Performance of high yielding varieties of Potato under FLD

Crop season/year	Varieties	Village	No. of Demonstrations	Area (ha)	Productivity (q/ha)	Increase in productivity over local (%)	Technology gap	Extension gap	Technology index
Rabi (2004-05)	Kufri chipsona-1	N. Bhalra	5	2.5	280	33.0	75	70	21
	Kufri Pukhraj		5	2.5	335	60.0	20	125	6
	3797 (local)		2	1.0	210	-	145	-	41
Rabi (2005-06)		Anguthi							
	Kufri chipsona-1		5	2.5	289	31.0	66	69	19
	Kufri Pukhraj		5	2.5	340	54.0	15	120	4
	3797 (local)		1	0.5	220	-	135	-	38
Potential yield with all inputs				355					

*Front Line Demonstration on improved varieties on potato productivity:*

Kufri pukhraj and Kufri chipsona were found better in terms of potato productivity against local check 3797 at Nagala Bhalra and Anguthi villages. Increase in potato productivity was observed from 20-50 % in both the villages. Kufri pukhraj performed exceptionally well over control and Kufri chipsona. In Nagal bhalra village, the potato productivity of Kufri chipsona and Kufri pukhraj was increased up to 60 % and 33 % while in Anguthi village it was 31 % and 54 % over local (3797) respectively. Yadav *et al*, 2007 also highlighted the impact of FLD in convincing the farmers for adoption of improved techniques for enhancing the pulse productivity. The technology index illustrates the achievability of the demonstrated technology at the farmer's field. More will be the scope of the technology demonstrated in yield enhancement with lower value of technology index, (Sager and Chandra, 2004). The technology index varied from 8-28 percentages under various improved nutrient management techniques (Table-3) and 4-41 percentages (Table 4) for varieties respectively. However the average value of technology Indices were estimated 14 percentages under nutrient management and 22 percentages under improved varieties of potato in both the year. This is in conformity of Mishra *et al.*, 2007.

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