

A case study- on production and promotion of storage capacity of onion in Indore district

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■ **ABSTRACT** : Onion is being cultivated at around 14.34 thousand hectare with production of 440.28 thousand tonnes (2015-16) in Indore district of Madhya Pradesh. It is being grown mainly for storage or direct sale to the market. Maximum area (95 %) under onion cultivation was recorded 13.600 thousand hac with production of 429.90 thousand tonnes during *Rabi* season. Out of 429.90 thousand tonnes of total production hardly 20 per cent (87.10 thousand tonnes) was stored under different storage structure and 72 per cent (278.315 thousand tonnes) onion were sold out directly to the market within 15 days of harvesting and remaining 15 per cent (64.485 thousand tonnes) recorded as post harvest losses. As a result during March to May prices of onion rule very low due to glut situation, thereafter, the rise in prices is quite rapid and sometimes wide fluctuation come about. Through intervention of technology by Krishi Vigyan Kendra, Kasturbagram as pre-harvest and post harvest technology management, enhancement of self-life and promotion of farmer's feasible storage structure were laid out with the help of Department of Horticulture, Government of Madhya Pradesh for promotion of onion storage warehouse.

■ **KEY WORDS** : Onion, Production, Storage, Promotion

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Onion (*Allium cepa* L.) is a crop of mass consumption and its demand remains constant year round in the market all over the country due to its usefulness as an essential ingredient in various culinary recipes and as raw in salad. It has also been an important foreign exchange earning crop for years which accounts about 80 per cent of total fresh vegetables export from India. Onion is cultivated at around 14.347 thousand hectares with production of 440.285 thousand tonnes of bulbs per annum (Anonymous, 2015) at Indore. The current year's production is estimated at 430.33 thousand tonnes. Onion crop is harvested during Mar - April and sold within 2 months due to lack of proper

storage facility. Most of the farmers bring onion directly to the market after harvest as proper storage facilities are not available with them. The present storage capacities are quite inadequate and most of available units are traditional and unscientific. Onions are stored either loose or in bags from May- November for a period of 4-6 months. However, 50 - 90 per cent storage losses are recorded depending upon genotype and storage conditions. The total storage losses are comprised of physiological loss in weight (PLW) *i.e.* moisture loss and shrinkage (30- 40%), rotting (20-30%) and sprouting (20-40%)

(Tripathi and Lawande, 2016). The PLW can be

minimized by harvesting at right time and subsequent storage at desired temperature and humidity. Generally, the rotting losses are at peak in initial months of storage, particularly in June and July when high temperature coupled with high humidity resulting the losses. However, proper grading and selection of quality bulbs and good ventilated condition can reduce the rotting losses. Fearing losses, farmers usually unload their entire stock within a month of harvest. As a result, during this period prices rule very low due to glut situation. Thereafter, the rise in prices is quite rapid and sometimes wide fluctuations occur leading to dissatisfaction amongst the producers as well as consumers leading to political and social calamity. In view of the peculiar situation a details study on production and storage facility was carried out. To improve the situation a case study was carried out for improving the self-life of onion and facilitate appropriate storage structures, both at farmers as well as at market level so that keeping quality and scientific storage can be enhance. To find out problems and to promote appropriate storage structure and agricultural technology for onion both at farm level as well as market place either by construction farmer's local model with modification or multipurpose onion structure.

■ METHODOLOGY

The current case study on onion was carried out for their production and postharvest handling at Indore district of Madhya Pradesh, during 2015-16 and 16-17. Data were collected from the office of Dy Director (Horticulture), Department of Horticulture, Indore. Block level data were collected with help Rural Horticultural Extension officer and Sub divisional Horticultural officer from concern blocks *i.e.* Sanwer, Depalpur, Indore and Mhow. Village level data were collected with help of krishak Mitra (Farmers friend) appointed by ATMA (Agricultural Technological Management Agency). Data

on area, production, storage capacity and post harvest losses were collected and analysed.

■ RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Status of onion production and storage potential in Indore district:

Area and production:

Onion is being grown mainly during for storage purposes and direct sale to the market. In Madhya Pradesh particularly at Indore district onion is cultivated mainly in three different seasons' viz., rainy, *Kharif*, late *Kharif* and *Rabi*. Sowing of rainy *Kharif* takes place during May-June. And so, late *Kharif* is in August-September and *Rabi* is in October-November maximum area (95%) under onion cultivation recorded during *Rabi* crop (13600 hac) while it is barely 5 per cent during late *Kharif*. Similarly production of *Rabi* onion account 95 per cent out of 429.900 thousand tonnes during 2015-16 (Table 1). Lack of storage facility and volatile market price is the major factors causing fluctuation in production which result in excess supply or demand.

Storage and post harvest facilities of onion at Indore district (MT):

Onion bulbs are generally stored from May to November for a period of four to six months. The present storage capacity for onion is about 31.600 thousand tons. With certain precautions like ventilation and proper packing in plastic netted bags, around 55.5 thousand tonnes were stored at house hold level which is unscientific and resulting 20 to 30 per cent storage loss. Present storage facilities is quite inadequate compared to our total production (429.90 thousand tonnes). Even

Table 1 : Area and production (2015-16) of onion

Sr. No.	Block	<i>Rabi</i>		<i>Kharif/Late Kharif</i>		Total area (ha)	Total production (Thousand Tons)
		Area (Thousand ha)	Production (Thousand tons)	Area (Thousand ha)	Production (Thousand tons)		
1.	Mhow	7.90	237.00	0.300	9.000	8.200	246.00
2.	Indore	2.70	81.00	0.150	4.500	2.850	85.50
3.	Depalpur	1.60	48.00	0.100	3.000	1.700	51.00
4.	Sanwer	1.40	42.00	0.180	5.400	1.580	47.40
	Total	13.60	408.00	0.730	21.900	14.330	429.90

Source – Department of Horticulture and Farm forestry Indore

most of the structures available are traditional and unscientific. Out of 429.900 thousand tonnes onion productions only 87.100 thousand tonnes (20%) was being store by different mechanism. Around 64.485 thousand tonnes (15%) post harvest loss was observed and remaining around 278.315 thousand tonnes (72%) were sold out directly to the market within the 15 days of harvesting.

Extent of storage and post harvest losses :

The onion bulbs are generally stored from May to November for a period of four to six months. However, 30-80 per cent storage losses are recorded depending upon genotype, farming practices and storage conditions. The total storage losses are comprised of physiological loss in weight (PLW) *i.e.* moisture loss and shrinkage (30-40%), rotting (20-30%) and sprouting (20-40%). To avoid such losses most of the farmers bring onion directly to the market after harvest as proper storage facilities and keeping quality are not favourable with them.

Existing onion storage model at Indore (Capacity metric tons) :

Onion storage is widely practised worldwide in accordance to their cultural and economical practice. In India, method of storage adopted mostly depends on the

traditional knowledge and commonly practised methods are bag, pucca/room, tat storage, bamboo, chawl structure, but the losses associated are quite higher. (Banuu Priya *et al.*, 2014). These type of onion storage structures are not found encouraging in Indore district. Only 32 models of 25 MT onion storage house and 15 onion warehouse of 50 MT capacities were built at Indore district (Table 4). Farmers are not interested to construct onion warehouse which was developed by NHRDF(National horticultural research and development foundation, Nasik) because this type of onion warehouse structure used for storing onion only and remain unutilized after November to April. Even in circumstances when the farmers were not growing onion such were house remain unutilized. There is a felt need of finalizing critical storage conditions for perishable horticultural produce like onion and development of post harvest management protocols suitable for cultivars and agro climatic condition (Kumar, 2011). Since most of the farmers belonging to Indore district are entrusted to build multipurpose warehouse so that other agricultural commodity can be store. Consequently warehouse especially for onion and other agro product has been developed by a group of local farmers. 11 such type warehouse has been constructed and being under utilization. More than 53 such type warehouse is under

Structure/Block	Mhow	Indore	Depalpur	Sanwer	Total (Metric tons)
Onion storage	0.900	0.350	0.150	0.200	1.600
Farmers low cost structure	16.000	8.000	3.500	2.500	30.000
Plastic netted / gunny bags	22.000	13.000	11.000	9.500	55.500
Total	38.900	21.350	14.650	12.200	87.100

Sr. No.	Extent of storage and post harvest losses	Thousand tonnes
1.	Proper storage	87.10
2.	Post harvest loss	64.48
3.	Direct sell	278.32

Sr. No.	Block	25 Metric ton	50 Metric ton
1.	Mhow	12	11
2.	Indore	8	3
3.	Depalpur	4	1
4.	Sanwer	8	0

construction at different villages.

Road map for enhancing storage capacity of onion:

Since the bulk of *Rabi* onion is harvested during April – May, just before the onset of the monsoon, the prices of onion decline during this period while the same shoots up during the rainy season. Non-availability of storage facilities at farm level forces farmers to sell their produce immediately after the harvest to save further deterioration during rains. In return, they get the most depressed prices and the middlemen in the trade get the advantage of volatility of prices of this essential commodity.

The prices of onion were as low as Rs. 500-600 per quintal during May, 2017 while they were over Rs. 3000 per quintal during July, 2017. The situation was much worse a couple of years back when there were insignificant storage structures at village level. If only the farmers had enough storage facilities to store and release the onion to the market evenly, the prices would have been less volatile and benefits would have accrued to both farmers and consumers.

Conventional storage of onion at the farm level had many pit falls. These temporary structures could not protect the produce from seepage of humidity and lacked aeration leading to high levels of sprouting and rotting of bulbs, thus resulting in high losses, neutralizing the advantages of higher price realization during of fearing losses, due minimum self-life, rotting and lack of proper storage facilities available with them, farmers usually unload their entire stock of onion just after the harvest. As a result, during this period prices rule very low due to glut situation. Thereafter, the rise in prices is quite rapid and sometimes wide fluctuations occur. The storage life of onion depends on various parameters like season, variety, bulb dormancy, nutrient and irrigation management, pest and disease incidence, pre-and post-harvest management practices and storage environment.

Intervention by Krishi Vigyan Kendra - Indore:

To mitigate the situation following strategy/ road map has been designed by krishi Vigyan Kendra, Kasturbagram, Indore.

Pre-harvest management (Cultural practices):

- Intervention through advisory, training and front

line demonstration.

- Restriction on use of excessive and delayed nitrogen application
- Keep away from excess irrigation
- Promotion of good storer cultivar of onion like Bhima Shakti, Agrifound light red.
- Pre-harvest spraying of mallic hydrazide @2500 ppm combined with 0.1% carbendazim spray at 10 days before harvesting in *Rabi* onions give enhance keeping quality.
- Field curing with windrow method and neck cut 2.5 cm enhance keeping quality

Post-harvest management:

For sustaining the availability, round the year, for meeting domestic and export requirement, there is need to increase productivity and improve quality through crop management and post harvest management (Gupta and Srivastava, 2008). Directorate of Onion and Garlic Research (DOGR) Rajgurunagar and NHRDF Nasik has developed and recommended different types of storage structures for storing onion bulbs. Bottom and side ventilated two-row storage structure and low cost bottom ventilated single row storage structure were reported by Gupta and Singh (2010). This type of storage structure is suitable only for storing onion bulbs, no any other agro commodity can be store hence farmers are not interested to construct such storage structure. Secondly onion crop is not being grown regularly by the farmers in this situation there is no use of onion storage without having onion crop. Therefore, to enhance the onion storage facility following out scaling plan has been made for enhancing storage facility in the district.

Promotion of farmer's level locally developed structure:

This 500 sq ft structure can store upto 500 quintals of onions. Its base - a wire mesh 6 inches above the ground, cooled by 6 exhaust fans - keeps the onions dry and cool and prevent them from rotting. This facility cost around Rs. 25,000 to build which is cheaper than storing in commercial storage facilities.

Promotion of onion multipurpose warehouse:

A out scaling plan has been developed to promote the construction 200 numbers of 50 MT multipurpose onion warehouse through National Agriculture development Scheme, Integrated Horticultural

development mission and storage of perishable commodities scheme, with help of Department of Horticulture during 2017-2018.

With above intervention in farming and promotion of 200 numbers multipurpose onion storage structure we can enhance the shelf-life of onion so that direct sell from field to market can be minimized which help to prevent market glut and price fluctuation. By promotion of storage capacity additional 10000 MT onions can be store upto the month of November.

Conclusion:

95 per cent (408.00 thousand tonnes) onion is being cultivated during *Rabi* season, due to lack of storage facilities around 72 per cent (278.32 thousand tonnes) onion were unloaded directly to the market fearing of losses owing to decay, shrinkage, rotting and sprouting. Consequently prices turn very low due to glut situation there after the rise in price noticed very rapid, leading to dissatisfaction among the farmer and consumer. To deal with such type situation pre and post- harvest technical intervention is the need of hour to enhance self-life and make possible to promote maximum number of proper onion storage structure.

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