



## KHARIF ONION PRODUCTION IN MADHYA PRADESH: SOIL PERSPECTIVE

**ANKUSH L KAMBLE, UTKARSH TIWARI and HIRANMOY DAS**

ICAR-Indian Institute of Soil Science, Bhopal, Madhya Pradesh

Onion is an important crop of almost all landmasses and is commercially cultivated in several countries. It is an essential item in every kitchenette as vegetable and condiment in India. Presently India is the second largest producer of onion in the world (Horticultural Statistics, 2017). The major onion producing states are Maharashtra, Madhya Pradesh, Karnataka, Gujarat, Rajasthan, Bihar, Haryana, Andhra Pradesh, Tamil Nadu, and West Bengal. These states account for almost 90% of the total onion production of the country. Madhya Pradesh is the second largest onion producing state in the country. It produces about 37,21,610 Metric ton of onion from 1,02,900 hectare area. During 2016-17, Madhya Pradesh accounted 16.59 per cent of total output of onion in the country, next to the Maharashtra, 30.03% (Horticultural Statistics, 2018).

In Madhya Pradesh onion grows in three seasons namely *Kharif*, *Late Kharif* and *Rabi*. The transplanting period of *Kharif* onion in Madhya Pradesh is July to August and it is harvested during October to December. The *Late Kharif* onion is transplanted during October to November and harvested during January to March. The farmers of Madhya Pradesh initiate transplanting of *Rabi* onion in December and complete it in January. The *Rabi* onion harvesting commence by the end of March and continues up to May end.



The area under *Kharif* and *Late Kharif* onion in Madhya Pradesh is increasing and consequently acreages under *Rabi* onion is falling (Table 1). The higher prices during October to January in a domestic market may be the reason for increasing acreages under *Kharif* & *Late Kharif* onion in Madhya Pradesh.

**Table 1.** Season wise cultivation of onion in Madhya Pradesh

Area in Thousand Hectares					
Five Years Average Area (2011-12 to 2015-16)			Sowing Status (2017-18)		
<i>Kharif</i>	<i>Late Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Late Kharif</i>	<i>Rabi</i>
8.7	2.3	99.6	15.6	6.6	81.3

The major onion producing districts of Madhya Pradesh are Indore, Sagar, Shajapur, Khandwa, Ujjain, Dewas, Ratlam, Shivpuri, Agar Malwa, Rajgarh, Dhar, Satna, Khargone and Chhindwara. The average annual rainfall of these districts ranges from 863mm to 1778mm, and most of it occurs during June to October. The onion can be grown under wide range of climatic conditions, but it grows best under mild climate without extreme heat or cold, or excessive rainfall. Also it can be cultivated in a wide range of soils from sandy loam to clay loam with good drainage facilities.

Generally, *Kharif* onion grows in those areas where the annual rainfall is less than 600 mm. However, the average rainfall in onion producing districts in Madhya Pradesh is more than 600 mm. The cultivation of *Kharif* onion in areas where high rainfall may limits its production and productivity. The intense and erratic rainfall gets frequent flooding events during *Kharif* season. The poor soil drainage and torrential rainfall situations get into water logging stress, leads to spoilage of onion at field. Due to its shallow root system, onion crop is highly sensitive to water logging stress. The high root density of onion occurs in top soil layer of 18 cm. This root growth habit of onion crop makes it



highly prone to adverse affect of soil flooding stress mainly during Kharif season.

The extent of damage due to heavy rains depends not only on the variety, intensity and duration of rainfall but also upon the site selection, soil selection, cultivation methods, soil management practices etc. Since the major part of the Kharif onion producing in Madhya Pradesh are assumed to be strongly exposed to water logging at present and in the future due to changing climatic scenario, farmers need to adopt appropriate soil management practices to cope with such stress conditions are of particular interest.

In the past, plenty of evidences explain that prices of onion skied during October - January due to spoilage of Kharif onion owing to vagaries of monsoon. In the year 2010, monsoon was delayed by one month and afterwards there was continuous rainfall till November. A rainfall of 200-300 mm was recorded in onion growing states in the months of October and November which was unusual. In November, there were unseasonal heavy rains in many onion growing pockets of Maharashtra, which caused damage to onion crop in different stages. The erratic and untimely rains damaged the Kharif, late Kharif crop as well as Rabi onion nursery. Hence, to obtain sustainable income from Kharif onion and minimization of price fluctuation in onion market, farmers' needs to adopt proper soil management practices.

#### SOIL MANAGEMENT PRACTICES FOR KHARIF ONION

Water-logging is one of the major abiotic stresses that severely limits onion productivity world-wide. In onion, bulb size and yield are the economically important parameters that are getting seriously hampered due to frequent flooding events during Kharif season. The intense and erratic rainfall gets severe due poor soil drainage consequently, affect the yield and productivity of onion. Onion can be cultivated on variety of soils such as sandy loam, clay loam, silt loam and heavy soils. However, selection of appropriate site for Kharif onion is highly imperative. The field selected for Kharif onion should have good drainage properties. Otherwise erratic and torrential rainfall during June to October will be a limiting factor for production of Kharif onion due to water logging.

Further, farmers of Madhya Pradesh usually plant onion on flat bed or in ridges and furrows with surface irrigation. The farmers cultivating onions in black soils felt that drainage is a problem during prolonged rain-spells. These methods provide less efficient nutrient management due to water logging which results small bulb size and higher disease incidence. The planting of

Kharif onion on Broad Bed and Furrow (BBF) system with drip irrigation resulted in higher yield compared to other methods (NRC Onion & Garlic). This method provides most effective drainage and ensures appropriate moisture conditions at root zones. The Broad Beds of size 1.2 meter width and 30 to 60 meter length is made using wooden plough or tractor drawn ridger. Two lateral lines of drip are place in each bed at 60 cm to maintain proper moisture by regulated irrigation. The surplus water due to excess rain drains out from the field through furrows. This ensures efficient drainage and avoids water logging. Also this reduces incidence of diseases. The wide beds ensure appropriate moisture and air near the root zone for better nutrient uptake and bulb development. The BBF system will be a certainly helpful for the farmers growing onion in Kharif season with torrential rainfall.

The nutrient management in Kharif onion production in Madhya Pradesh is most important because the leaching and runoff losses of nutrient are high due to heavy rains. Hence along with selection of appropriate land / field and planting method, farmers need to focus on appropriate nutrient management recommended by research institutions & universities for that particular area.

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