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A Technical Note on Impact of Prevailing Temperature on Pulse Productivity: (Pigeonpea+ Rabi Pulses)

India is the largest producer of pulses in the world with 25 % share in the global production. As per WWWR (Weakly Weather Watch Report) for week ending 7th January, 2016, approximately 134 lakh hectares area has been planted under rabi pulses. The normal rabi pulses area (aveg. 2009-10 to 2013-14) is under 39 lakh ha approximately. The coverage during current rabi is almost at par at the last years corresponding period.

Chickpea, Pigeonpea, Mungbean, Urdbean, Lentil and Fieldpea are important pulses presently standing in the field.

Rainfed pulses under in India are becoming a high risk crops mainly due to wide fluctuations in temperature and rainfall characteristics (uncertain, erratic and inadequate rainfall). The cultivation of pulses in these regions has now turned to be a big gamble for traditional farmers growing pulses.

The prevailing weather systems with higher levels of warming across the country with rapid increase in night temperatures are likely to adversely affect the rabi crop productivity.

Higher day and night temperatures may likely to have an adverse effect on productivity on account of reduction in during a total crop life cycle, ultimately a lowering total factor productivity. Reduction in yield is more pronounced to the crops which are generally grown under rainfed conditions with hardly any option to provide critical/life saving irrigations.

The winter legumes under rainfed conditions in India are experiencing a kind of hidden stress that is atmospheric drought, associated with insufficient or lack of due precipitation, as a result of high night temperature. The moisture available in the air as "invisible water reservoir of nature" can only be easily accessed by the crops provided the nights or comparatively cool to form dew/precipitation.

The most important impact of higher temperature is on the critical physiological stage of the crop i.e. the reproductive phase in pulses that affect ***pod set, seed set and yield viz.:*** (i) flowering time, (ii) asynchrony of male and female floral organ development, and (iii) impairment of male and female floral organs. While this review emphasises the importance of high temperatures >30 degree centigrade, the temperature range of 32–35 degree centigrade during flowering also produces distinct effects on grain yield.

- Among the pulses, pigeonpea is very sensitive to abrupt fluctuations of temperatures either lower or higher extremes leading to massive flower drop.
- The negative impact of temperature extremities is largely compensated by regular fresh flush of flower that keep on appearing during the developmental stages as and when the temperature is favorable. However at extreme high temperature the serious adverse impact is observed on pod setting.

- For cool season pulse crops daily maximum temperature above 25^0C is considered as threshold level for heat stress, as it affects seed yield by reducing flowering, fertilization and seed formation.
- Cool season pulses such as ***chickpea, lentil and lathyrus*** have reasonably high tolerance to wheat which enables them to set pod but ***filling of pods*** is seriously jeopardized at high temperature leading low productivity.
- Fieldpea is highly sensitive to ***heat at bloom***. A brief exposure to high temperature during flowering cause heavy loss due to ***flower drop and pod abortion*** and during grain filling. It can reduce ***seed set, weight and accelerate senescence***, resulting reduced seed yield.

Some Varietal Study

During the past few years, an abrupt rise in temperature has been observed in the months of January and February in north India, Which led to poor yield in the ruling variety of field pea- HUDP 15. In an experiment at Kanpur, it was observed that high temperature coincided with the onset of reproductive phase of HUDP 15 adversely affected not only total biomass, but also pod setting by 30 per cent, seeds per pod by 41 per cent and seed weight by 36 per cent and yield by 48 per cent.

***It is concluded that the impact of higher temperature in pulses productivity, may however, be less severe than that of cereals like wheat and also mitigate losses of productivity if life saving irrigation provided to pulse crops*.**

Dated 12.01.2016

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