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*Short Communication*

# Crop Planning Based on Moisture Adequacy Index (MAI) of Different Talukas of Aurangabad District of Maharashtra

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The main reason for very low and highly unstable yields in a particular region is the soil moisture stress during active growth period of the crops. Rainfall is prime source of water to the soil. The most important aspect is proper distribution of rainfall, in order to meet the combined demand of transpiration from plants and evaporation from soils. The crop production in tropical areas is very closely related to moisture availability and soil characteristics. The rainfall distribution is highly erratic and uncertain both in time and space and thereby the Moisture Availability Index (MAI) also becomes very uncertain. The cropping patterns are basically dependent on MAI. Hargreaves (1971) defined Moisture Availability Index (MAI) as the ratio of assured rainfall expected at 75% probability and potential evapotranspiration for the concerned period. However, Thornthwaite and Mather (1955) calculated Moisture Adequacy Index (MAI) as the ratio of actual and potential evapotranspiration. The MAI is prime factor for crop planning especially in tropics and varies both in time and space. MAI was worked out on the basis of average monthly rainfall (Raman and Murthy, 1971). However, in such systems the monthly MAI values were not truly representative as month is a longer period for planning and cultural operation. Moreover, if there are dry spells causing crop failure, the monthly MAI may not represent the scenario. Hence, there is a need to use weekly MAI for agricultural planning. For planning of the seasonal crops and cropping pattern, the weekly MAI values would be most suitable. It was therefore, MAI on weekly basis were computed to find out the water availability periods for different types of soils of Aurangabad district of Maharashtra to suggest suitable cropping pattern.

Twenty seven years of daily rainfall data of each taluka of Aurangabad district from 1983-2009 and weather data of Aurangabad station of the same period were collected. This daily rainfall and weather data were converted to weekly data and used for analysis of weekly MAI (moisture availability index). The weekly weather data were used to calculate weekly PET (potential evapotranspiration) using Penman formula. The weekly AET (actual evapotranspiration) and weekly MAI were calculated by using weekly rainfall and weekly PET with the help of Thornthwaite water balance method. The weekly MAI was calculated as AET/PET. For suggesting the cropping pattern in Aurangabad district, major three soil types viz. shallow soil having 100 mm AWHC (available water holding capacity), medium soil having 200 mm AWHC and deep soil with 200 mm AWHC were considered and the MAI also computed for these three values of AWHC (100 mm, 150 mm and 200 mm). The crop growth period was considered for the period during which the MAI was more than 0.5 at the time of sowing and active vegetative growth period and more than 0.3 at the time of maturity. All periods during active vegetative growth for which MAI was less than 0.5 were considered as dry spell.

During *kharif* season the moisture availability periods on all three types of soils at 0.3 and 0.5 MAI were 17 weeks in all talukas of Aurangabad district except Phulambri taluka. During *rabi* season the moisture availability periods at 0.3 MAI ranged between 7 to 13 weeks and at 0.5 MAI between 4 to 11 weeks on medium and deep soils (Figure 1). The MAI dropped below 0.3 during *rabi* season in all talukas indicating that terminal moisture stress condition for post monsoon crop. Therefore, the supplemental irrigation is suggested from either recycled water or canal or groundwater.

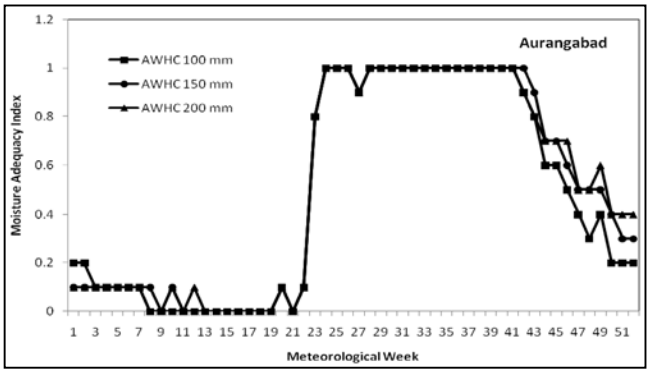
Pearlmillet, sorghum, black gram, sunflower have been found promising crops on shallow soils during *kharif* season. Dryland horticultural crops like ber, custard apple, tamarind, aonla, etc. are suggested in shallow soils for alternate land use.

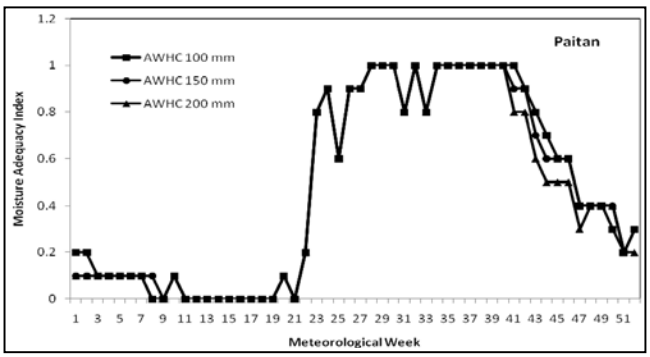
Pearlmillet, sorghum, maize, green gram, black gram, pigeonpea, soybean, sunflower, cotton, sugarcane in command area are suggested in medium and deep soils during *kharif* season. Pearlmillet + pigeonpea, sorghum + pigeonpea and soybean + pigeonpea intercroppings are remunerative in medium and deep soils during *kharif* season. Vegetable crops like chilli, brinjal, tomato, onion and horticultural crops like mango, citrus, pomegranate, guava etc. are suggested in medium and deep soils.

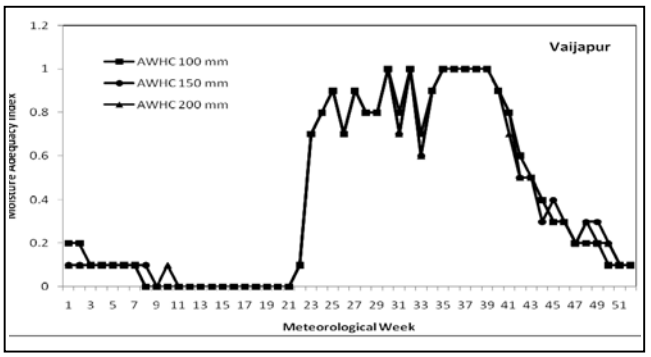
Sorghum, wheat, bengal gram, sunflower, safflower and sugarcane in command area are suggested for *rabi* season on medium and deep soils. Vegetable crops like cole crops and potato, tomato, onion, etc. are suggested during *rabi* season

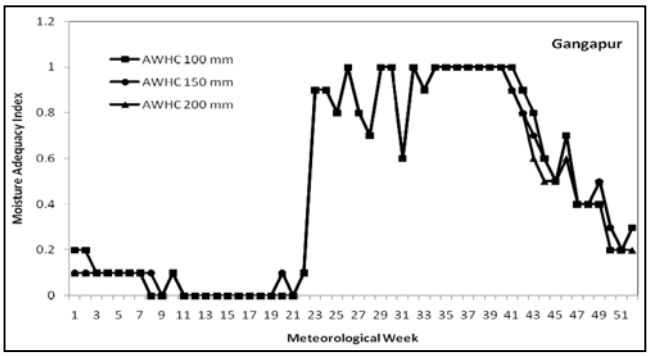
particularly in command area. As the MAI falls below 0.3 in later weeks, therefore, it is suggested to advance the date of sowing of some rabi crops to avoid mid-season and terminal moisture stress. Sugarcane and wheat crops are mainly suggested in irrigated command area.

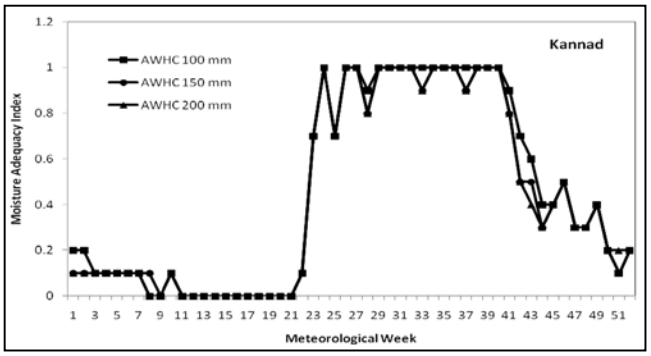
There is a short growing period (less moisture availability periods) for *rabi* crops particularly in Vaijapur, Kannad and Phulambri taluka. Therefore, it would be advantageous to adopt moisture conservation practices like mulching, improved management practices like timely sowing, optimum plant population, timely interculturing operations and basal fertilizer use to increase and stabilize production.

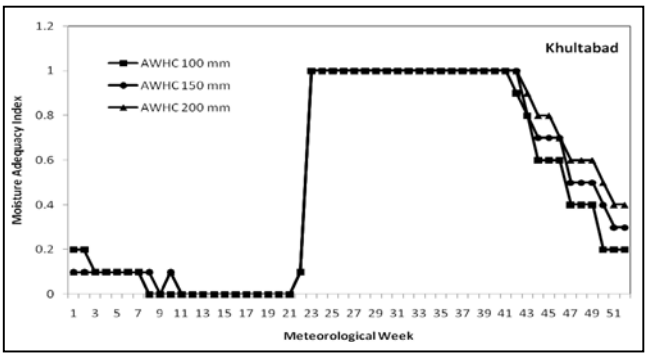


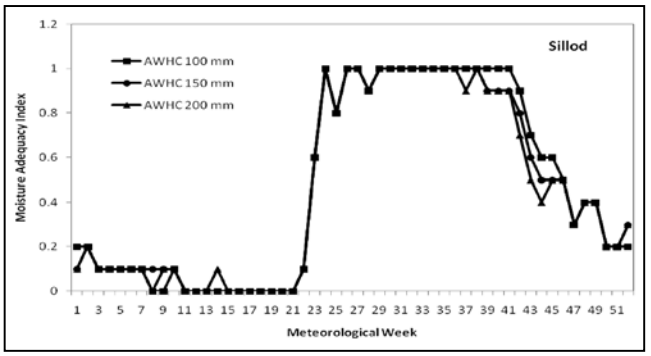



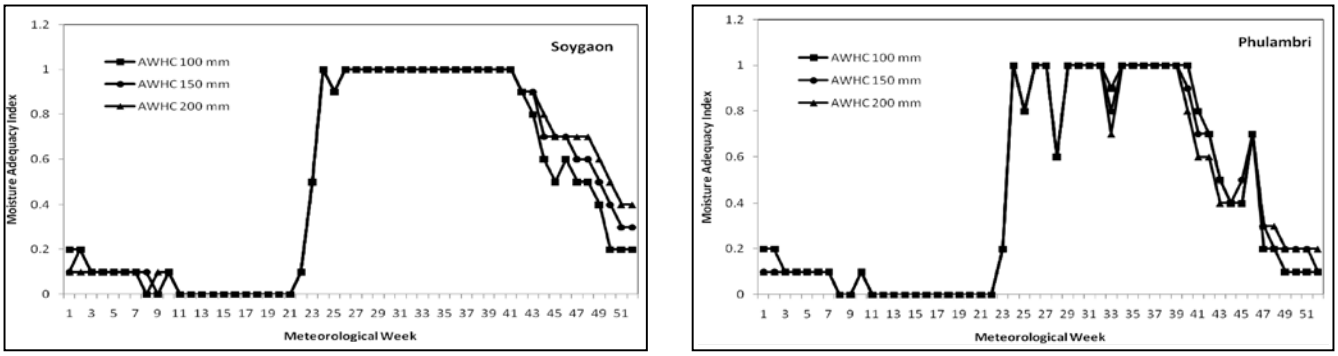



**Fig. 1 : Weekly MAI in different soil types (at 100 mm, 150 mm and 200 mm AWHC) in different talukas of Aurangabad district**

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