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## INFLUENCE OF WATER AVAILABILITY ON YIELD OF GREENGRAM

Greengram commonly known as mung (*Vigna radiata*) is an important pulse crop of drylands of western Rajasthan. Since greengram has capacity to fix atmospheric nitrogen and is sufficiently drought hardy by virtue of its deep root system, it is cultivated, under rainfed conditions in low rainfall tracts. Though pulses hold an important place in our national economy, not much literature is available explaining year to year variations in grain yield of greengram as influenced by water availability conditions during the growing season. Therefore, an attempt has been made to explain the year to year variability in grain yield of greengram as influenced by water availability to identify the conditions under which better yields can be obtained.

2. The greengram (var. S-8) of 65 to 70 days duration was grown in the sandy to loamy sandy soils with a row spacing of 30 cm at the Central Arid Zone Research Institute, Jodhpur during the years 1973-82 and the crop yields were recorded under the All India Coordinated Research Project on Dryland Agriculture. The daily rainfall data as well as the other meteorological parameters required for estimation of potential evapotranspiration using Penman's formula were recorded at the agrometeorological observatory nearer to the experimental site. The actual water use by the crop and the ratio of actual evapotranspiration to the potential evapotranspiration (AE/PE) have been estimated weekwise by using Thornthwaite and Mather's book-keeping procedure with the help of tables prepared by Krishnan and Sastri (1978) assuming that the water holding capacity of the soil is 150 mm.

3. The ratio of AE/PE indicates the rate at which water is available to the crop compared to the demand for water and, therefore, is a better index for representing water availability to the crop. The average grain yield during the years 1973 to 1982 is 8.9 q/ha. Fig. 1 shows the weekly distribution of AE/PE values during the years with (a) good yield, (b) average yield and (c) poor yield (for representative years). During the year 1973, despite of periodical stress conditions in the early stages of growth, water availability at potential rate from 6th to 10th week resulted in getting maximum yield of 18.3 q/ha. Slight decrease in water availability compared to potential rate during 7th week

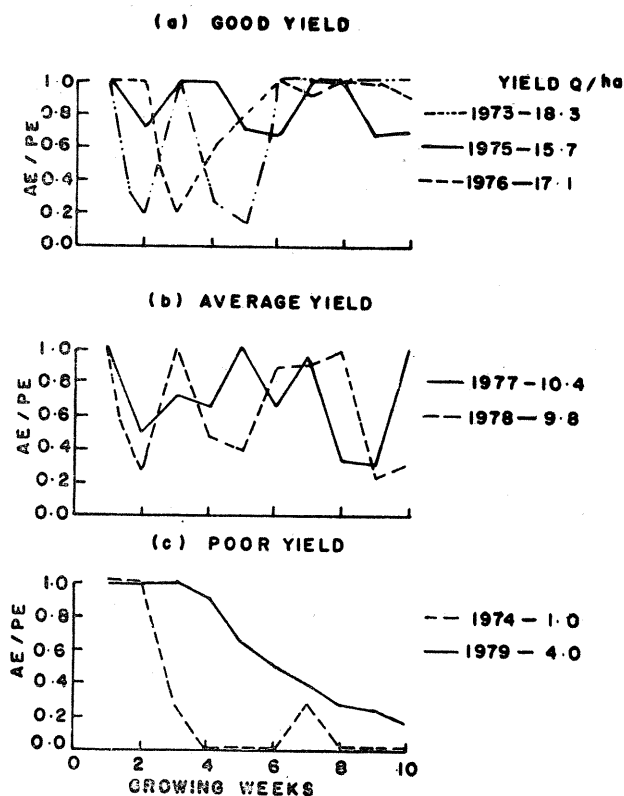


Fig. 1. Water availability to the greengram crop during growing season

resulted in decrease of yield by 1.2 q/ha in the year 1976. Water availability at the rate of 68 per cent during 6th and 9th weeks in the year 1975 resulted in the grain yield of 15.7 q/ha.

4. Though the yield levels are average and identical during the years 1977 and 1978, the crop experienced stress conditions at the time of flowering in the 4th and 5th weeks in 1978 whereas the crop experienced stress conditions in the 8th and 9th weeks coinciding with pod development stage in 1977. Extreme moisture stress from 4th week onwards resulted in almost total failure of the crop during the year 1974. However, water availability almost at potential rate upto 4th week followed by increasing stress conditions during the later stage of growth resulted in a very low yield of 4.0 q/ha during the year 1979.

5. The correlation coefficient between the mean AE/PE during the period from 6th week to 9th week coinciding with pod formation and development stage and the grain yield was found to be 0.97 which is significant at 1 per cent level thus indicating that

94 per cent variation in grain yield is influenced alone by the water availability conditions to the crop during pod formation and development stage. The curve-linear regression relationship between the yield  $Y$  (in q/ha) and mean AE/PE during the period from 6th to 9th week ( $X$ ) was found to be :

$$Y = 0.1254 + 11.7729 X + 6.2089 X^2$$

6. The above study reveals that the stress conditions during the period from 6th to 9th week coinciding with pod formation and development stages affect the grain yield of greengram to a considerable extent. The study also brings out that the yield fluctuations can be explained better on the basis of water balance studies.

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#### Reference

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