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Short Communication

Water requirement satisfaction index of groundnut under south-Telangana agro-climatic conditions

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Productivity of groundnut crop under rainfed conditions depends mainly on the availability of soil moisture during crop growth period. Moisture stress at critical stages results in a reduction in pod yield of groundnut. Ramesh Babu *et al.*, (1984) recorded significant reduction in pod yield of groundnut when late pod development and maturity periods were subjected to moisture stress. Nageswara Rao *et al.*, (1985) recorded greatest reduction in kernel yield when moisture stress coincided with pod filling phase. A close relationship was observed between moisture stress, expressed as WRSI and bajra yield (Yogeswara Rao *et al.*, 1988 and Victor *et al.*, 1988). In this paper, an attempt was made to assess the impact of moisture stress on pod yield of groundnut by using WRSI under South Telangana agro-climatic conditions.

Field experiments were conducted for seven years during *kharif* seasons of 1993 to 1999 at Agricultural Research Institute, Rajendranagar, Hyderabad to study the relationship between WRSI and pod yield of groundnut. Annual normal rainfall of Rajendranagar is 744 mm as against the potential evapotranspiration (PET) of 1612 mm. Rainfall occurs mostly during South-West monsoon period from June to September. Experiment was laid out in split plot design with four replications. Treatments comprised of 3 dates of sowing in a year as main plots at 15 days interval starting with the onset of monsoon during every year and two varieties i.e. TMV-2 and ICGS-44. A constant set of agronomical practices were adopted throughout the crop growth period. In this paper, data on cv. ICGS-44 were utilized to study the impact of moisture stress on pod yield. The treatments (9 out of 21) affected by biotic stresses like collar rot, bud necrosis and leaf spots were excluded from the study since the WRSI does not account for these stresses. Yield data were recorded in all the years of experimentation. The climatic data recorded in observatory situated near the experimental field was used. Weekly values of PET were computed year wise, using Penman's (1948) method. The crop coefficient values (Kcr) for groundnut as given by Doorenbos and Pruitt (1977) were employed.

The weekly crop water requirement (WR) was calculated. By adding the weekly values, a total crop water requirement was obtained. The WRSI in per cent was computed following Frere and Popov (1979) by dividing the amount of water utilized by the crop during the entire life cycle with the

Table 1 : Pod yield (kg ha^{-1}) and WRSI as influenced by dates of sowing

Date of sowing	Sowing week	WRSI	Pod yield
D_1 (16.07.93)	29	97	1593
D_2 (12.08.93)	33	88	995
D_3 (11.08.94)	33	86	718
D_4 (24.06.95)	25	100	2157
D_5 (15.07.95)	29	100	1748
D_6 (05.08.95)	32	94	1210
D_7 (07.08.96)	27	100	2245
D_8 (23.07.96)	30	94	1218
D_9 (21.07.97)	29	84	690
D_{10} (09.07.98)	28	98	1481
D_{11} (18.06.99)	25	96	1838
D_{12} (06.07.99)	27	96	1458

actual water requirement of the crop. The WRSI indicates the extent to which the water demand of crop during the period has been met cumulatively at the end of crop maturity. This, inturn gives an idea on the stress undergone by the crop at any stage of its life cycle. Thus, WRSI is directly related to the economic yield. By employing regression techniques, a linear regression model based on the values of WRSI was developed to predict groundnut pod yield.

Data on pod yield, WRSI and sowing week are presented in Table 1. Results revealed that the lower WRSI resulted in reduced yields. The lower values of WRSI ranged between 84 to 88 and corresponding pod yields were between 690 and 990 kg ha^{-1}. There was a proportional reduction in pod yield with the decrease in WRSI values indicating the effect of moisture stress (Yogeswara Rao *et al.*, 1990). When WRSI values reached to 100, higher yields of 1748 to 2245 kg ha^{-1} were realized. In general the yields were low due to delayed sowings as the crop experienced moisture stress with an exception in the year 1996.

Correlation studies between WRSI and pod yield revealed that significantly positive correlation (r=0.92) existed between pod yield and WRSI. The yield prediction model obtained from this study is

$Y=-6400+83 * X$ ($R^2=0.84$)

where

Y = pod yield in kg ha^{-1} and X=WRSI(%).

This model is able to account 84 per cent of total variation in pod yield (Fig.1).

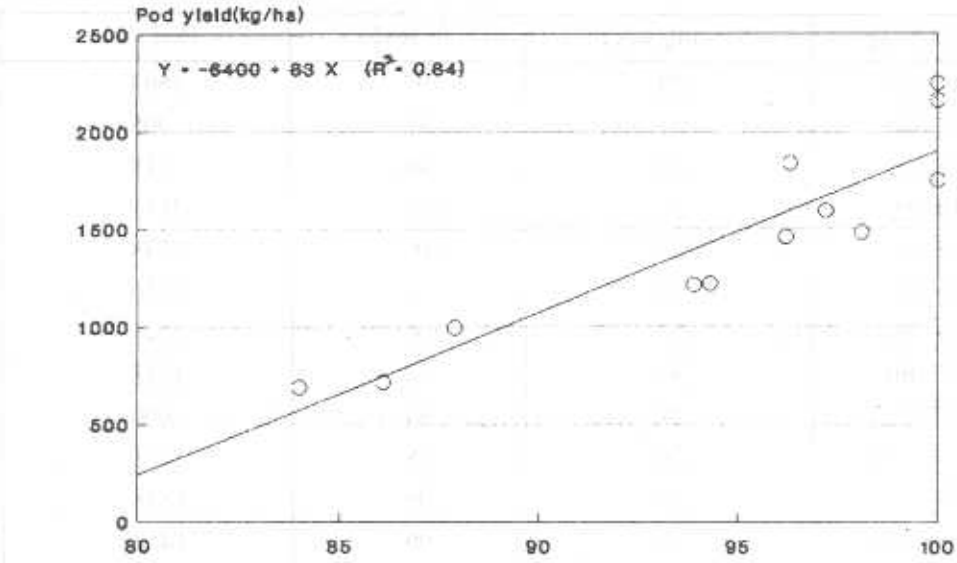

Fig. 1 : Relationship between WRSI and pod yield of groundn

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