

## EVALUATION OF PROMISING WHEAT VARIETIES UNDER DIFFERENT LEVELS OF IRRIGATION

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### ABSTRACT

The experiment on promising wheat varieties was conducted under three levels of irrigation at the Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore for four years (1982-1983 to 1986-1987). Adequate irrigations at six growth stages viz., crown root initiation (CRI), late tillering, late jointing, flowering, milk and dough stages produced maximum grain yield. Among the different varieties HD 2189, DWR 39, NI 8811, HD 4502, NI 5439, HD 2380 and NI 8841, proved better than others under adequate irrigations, whereas, DWR 39, HD 4502 and NI 5439 performed better with two irrigations viz., at CRI and boot stage.

**KEY WORDS:** Wheat varieties, Irrigation levels, Yield.

Water is a precious commodity and its judicious use is essential for maximising wheat yields. With holding of water at various growth stages is not equally damaging and, therefore, induced moisture stress at certain physiological growth stages may reveal useful information for the efficient use of water (Agarwal and Yadav, 1978). Crown root initiation (CRI) stage is the most critical one among all the six critical stages for moisture in wheat (Cheema *et al.* 1973). Several workers have suggested the number and time of irrigation under limited and sufficient water supply conditions with different combinations of growth stages for different wheat varieties (Singh *et al.* 1986, Jadhav and Jadhav 1983, Joshi and Singh 1983). However, information on the irrigation requirement of wheat is lacking under Tamil Nadu conditions. Also varieties respond to better growth with limited irrigations have to be identified. Therefore, the present investigation was taken to find out the irrigation requirement of wheat and to identify the performance of new wheat varieties under limited and adequate irrigations.

### MATERIALS AND METHODS

Field experiments were conducted during the winter seasons of 1982-1983 to 1986-

1987 at the Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore, under All India Coordinated wheat Improvement project to study irrigation requirement of wheat, to assess the performance of new wheat varieties under limited and adequate irrigations and to estimate the reduction in yield due to limited irrigations.

The experimental field was clay loam, with low, medium and high in available N, P&K respectively. The experiment was laid out in split plot design with three replications. The irrigation levels comprised of one irrigation (CRI stage), two irrigations (CRI and boot stage) and adequate irrigations (CRI, late tillering, late jointing, flowering, milk and dough stages) tried in main plots. In sub plots new wheat varieties were tested and the experiment was sown on 12-11-1982, 14-11-1983, 30-11-1985 and 20-11-1986 during the respective years. A fertilizer dose of 60 kg N and 30 kg P ha<sup>-1</sup> was applied to all the plots. Half of the N and full dose of P were applied as basal and the remaining half of the N was applied on 21st day after sowing. (DAS). Irrigations to different plots were given as per treatment schedule. Five cm of water was applied at each irrigation. All other recommended cultural practices were followed.

## RESULTS AND DISCUSSION

The irrigation levels increased the grain yield of wheat in all the four years (Table 1). The increase in grain yield with adequate irrigations was greatest over one and two irrigations in the years of experimentation. The increase of grain yield with increased levels of irrigation would have been associated with higher and better distribution of assimilates. Similar increase of grain yield with increased levels of irrigation have been reported earlier (Singh 1986, Singh *et al.* 1986).

One irrigation at CRI stage and two irrigations at CRI and boot stage comparatively produced more grain yields during the years 1982-1983, 1983-1984 and 1985-1986. During fourth year (1986-1987), one irrigation at CRI stage failed to produce any grain and two irrigations gave very meagre grain yield. The rainfall distribution during the crop growth period for different years were 71.4, 210.9, 64.2 and 26.4 mm respectively. Failure of crop with one irrigation was attributed due to less quantum of rainfall during the year 1986-1987 which would have lead to marked reduction on ear number unit area<sup>-1</sup>.

In the first year (1982-1983), varieties HD 2189 and DWR 39 gave more grain yield with adequate irrigations. The variety DWR 39 gave the highest yield with one irrigation and two irrigations indicating its ability to utilise the available moisture very efficiently. During second year (1982-1983) varieties HD 4502 and NI 8611 produced more grain yield with adequate irrigations, whereas with two irrigations HD 4502 produced more grain yield over other varieties. This suggest that HD 4502 has got potential to perform better under limited water supply, if a considerable quantity of rainfall is received during the season.

During the third year (1985-1986), the variety NI 8629 produced more grain yield over other varieties followed by NI 5439. Under one and two irrigations NI 5439 gave highest yields when compared to other varieties. During the fourth year (1986-1987), varieties NI 5439, HD 2189, HD 2380 and NI 8841, gave more grain yield with adequate irrigations. With one irrigation, all the varieties failed to produce any grain and with two irrigations the grain yield is very low. The poor performance of all the varieties during the fourth year was due to low rainfall during the growth period (26.4 mm, especially during earlier growth period).

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Table 1. Effect of wheat varieties and levels of irrigation on wheat grain yield ( $q.ha^{-1}$ )

Varieties (V)	Levels of Irrigation (I)															
	(1982-1983)				(1983-1984)				(1985-1986)				(1986-1987)			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
NI 8188	7.7	8.2	14.1	10.0	5.9	14.4	14.2	11.5	-	-	-	-	-	-	-	-
NI 8272	9.6	10.2	14.4	11.5	10.7	13.1	16.1	13.3	-	-	-	-	-	-	-	-
NI 8306	8.0	8.8	14.1	10.3	9.7	15.3	15.7	12.0	-	-	-	-	-	-	-	-
RVR 1333	12.8	13.8	14.8	13.8	-	-	-	-	-	-	-	-	-	-	-	-
APAU 1577	13.8	14.4	10.7	12.9	7.7	6.0	17.9	10.5	-	-	-	-	-	-	-	-
PBN 22.28	11.9	12.7	14.1	12.9	-	-	-	-	-	-	-	-	-	-	-	-
HD 2189	15.5	16.2	20.3	17.3	14.6	19.3	19.8	17.9	-	-	-	-	F	2.0	26.0	14.0
DWR 39	19.1	20.7	22.0	20.6	-	-	-	-	-	-	-	-	-	-	-	-
NI 8414	-	-	-	-	8.6	15.3	15.7	13.2	-	-	-	-	-	-	-	-
NI 8611	-	-	-	-	6.1	16.4	29.5	17.3	-	-	-	-	-	-	-	-
MACS 1992	-	-	-	-	4.8	6.5	16.6	9.3	-	-	-	-	-	-	-	-
HD 4502	-	-	-	-	16.3	24.5	31.2	23.9	7.3	9.6	15.0	10.6	-	-	-	-
NI 5439	-	-	-	-	10.2	10.0	19.4	23.9	-	-	-	-	-	-	-	-
NI 8629	-	-	-	-	-	-	-	-	11.0	16.6	18.9	15.5	-	-	-	-
NI 8729	-	-	-	-	-	-	-	-	7.9	14.0	9.2	10.4	-	-	-	-
NI 8763	-	-	-	-	-	-	-	-	7.9	6.2	8.4	7.5	-	-	-	-

MACS 2152	-	-	-	-	-	-	-	-	8.4	7.8	7.3	7.8	-	-	-	-
MACS 2172	-	-	-	-	-	-	-	6:1	10.0	12.2	9.4	9.4	-	-	-	-
HD 2380	-	-	-	-	-	-	-	14.2	16.6	16.6	15.8	15.8	F	2.1	26.4	14.0
NI 5439	-	-	-	-	-	-	-	18.0	19.2	19.4	18.9	18.9	F	2.3	27.5	14.9
NI 8796	-	-	-	-	-	-	-	-	-	-	-	-	F	3.2	25.4	14.3
NI 8838	-	-	-	-	-	-	-	-	-	-	-	-	F	1.5	21.2	11.3
NI 8841	-	-	-	-	-	-	-	-	-	-	-	-	F	1.3	26.1	13.7
NI 8858	-	-	-	-	-	-	-	-	-	-	-	-	F	1.6	26.5	14.0
MEAN	12.3	13.1	15.6	-	9.5	14.1	19.1	10.1	12.5	13.3	13.3	-	-	2.0	25.6	-
CD (5%) I		0.80				1.04			0.64					1.05		
I at V		1.19				1.30			0.39					1.80		
I at V		1.90				2.26			1.08					2.96		
V at I		1.86				2.37			1.27					2.55		

A = One irrigation      B = Two Irrigations      C = Adlquate irrigations      D = Mean      F = Crop failed