

EFFECT OF PRE-SOWING SEED TREATMENT ON THE PHYSIO-MORPHOLOGICAL CHARACTERS AND YIELD OF KALYAN SONA WHEAT UNDER RAINFED CONDITION.*

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A field trial was conducted in the two consecutive winter seasons of 1978-79 and 1979-80 to investigate the effect of pre-sowing seed treatments (CaCl₂-0.25%, KCl-2.5%, distilled water and no soaking as control) along with four Phosphate doses (0, 20, 40 and 60 kg P₂O₅/ha) on flowering behaviour and yield of Kalyan Sona wheat under rainfed condition. The seed treatment with calcium significantly increased the grain filling period by hastening the a) days to 50% ear emergence, b) days to anthesis and c) days to maturity and consequently increased the grain yield. 60 and 40 kg P₂O₅/ha also showed the same trend although without being significant. Further grain yield was found to be positively correlated with grain filling period.

Pre-sowing hardening of seeds increases the yield of crops grown under soil and atmospheric drought (Misra and Sen, 1981) and it is one of the methods for inducing drought resistance in plants (Henckel, 1964). It brings about, inter-alia, effective changes in the flowering behaviour of plants by influencing the growth, development and different metabolic processes (Gupta, 1961). Keeping this in view the following experiment was conducted to investigate the effect of chemicals on the physio-morphological behaviour and yield of Kalyan Sona wheat under rainfed condition and its inter relationship.

MATERIAL AND METHODS

The trial, consisting of four pre-sowing seed treatments (CaCl₂, 0.25%,

KCl-2.5%, distilled water and no soaking as control) and four phosphate doses (0, 20, 40 and 60 kg P₂O₅/ha) making 16 treatment combinations, was laid out in a split plot design keeping seed treatments in the main plot and phosphate doses in the sub plot under rainfed condition with three replications. The variety taken was Kalyan Sona and the seed rate was 100 kg/ha. Nitrogen and potash were given at the rate of 60 and 30 kg/ha through urea (46% N) and muriate of potash (60% K₂O) respectively. And the phosphate was given through single super phosphate (16% P₂O₅) as per the doses. The physio-morphological observations taken were a) days to 50% ear emergence, b) days to anthesis, c) days to maturity and d) active grain filling period.

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The number of days required from the date of sowing to 50% ear emergence and anthesis on the main shoot in the middle of two rows of plants in each plot was recorded. And the number of days from sowing to complete drying out of ears of both tillers and main shoot were recorded as days to maturity from the same two rows selected for 50% ear emergence. The period between anthesis and maturity was expressed as active grain filling period.

The total amount of rainfall received by the crop through out the growth period was 94.6 mm and 69.1 mm in first year (1978-79) and second year (1979-80) respectively. While most of the rainfall in first year occurred during the later part of the crop growth; in second year its distribution was more even and was maximum at the crown root initiation stage.

RESULTS AND DISCUSSION

Calcium treatment took significantly less number of days to 50 per cent ear emergence and days maturity followed by potash and water treatments, while no soaking recorded the highest number of days (Table 1). Days to anthesis also showed the same trend as other two characters although without being significant. And this led to highest grain filling period by calcium resulting in the maximum grain yield.

Phosphate doses failed to bring about any significant differences in these characters. But the trend showed that 60 and 40 kg P₂O₅/ha had the least

number of days to 50 per cent ear emergence, days to anthesis and days to maturity which resulted in the greater grain filling period. 60 and 40 kg P₂O₅/ha also produced greater yield than other two doses.

The correlation studies further revealed that grain yield was positively correlated with grain filling period and negatively correlated with other characters. Days to 50 per cent ear emergence, days to anthesis and maturity were all negatively correlated with grain filling period (Table 2).

It is thus obvious from the result that calcium and potash seed treatments and 60 and 40 kg P₂O₅/ha and more effective for rapid growth and development of Kalyan Sona under rainfed condition. It is most probably due to quicker germination, increased rate of photosynthesis and translocation of nutrients which lead to the hastening of ear emergence, anthesis and maturity. Gupta (1961) also found an enhanced rate of growth and more intensified physiological processes of wheat due to seed treatment with calcium, potash and sodium. Swaminathan (1968) pointed out that yield of wheat is directly correlated with grain filling period.

The greater grain yield in the second year (1979-80) was due to the moisture received by the crop through rainfall at its crown root initiation stage.

Table 1: Effect of treatments on flowering behaviour and grain yield

Treatment	Days to 50% ear emergence		Days to anthesis		Days to maturity		Grain filling period		Grain yield (t/ha)	
	1978-79	1979-80	1978-79	1979-80	1978-79	1979-80	1978-79	1979-80	1978-79	1979-80
CaCl ₂	64.3	65.5	72.3	72.5	121.2	122.3	48.8	49.8	22.5	25.3
KCl	64.9	65.8	72.0	72.7	121.3	122.4	48.7	49.7	21.2	24.0
Distilled water	65.0	66.4	72.8	73.3	121.4	122.5	48.6	49.2	19.9	23.0
Control	66.0	67.3	73.3	73.0	121.4	122.6	48.1	48.9	17.4	20.3
S.E.m ±	0.4	0.3	0.4	0.4	0.1	0.1	0.1	0.2	0.4	0.4
C.D. at 5%	1.2	1.0	NS	NS	0.2	0.2	0.4	0.8	1.4	1.6
F ₁	65.7	65.9	73.1	73.5	121.0	122.6	48.4	49.2	17.1	20.0
F ₁₂	65.5	65.8	72.9	73.1	121.4	122.5	48.5	49.4	18.2	22.1
F ₁₆	65.2	65.6	72.6	72.9	121.2	122.3	48.7	49.5	21.9	24.9
F ₁₈	65.2	65.4	72.4	72.7	121.1	122.2	48.9	49.5	22.7	25.8
S.E.m ±	0.3	0.3	0.4	0.3	0.2	0.2	0.1	0.3	0.4	0.5
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	1.2	1.3

REFERENCES

- GUPTA, S. M. 1961. Effect of alternate soaking and drying treatment of seed upon seedling growth rate. *Proc. 48th Indian Sci. Cong. Part III. No. 197* : 330
- HENCKEL, P. A. 1964. Physiology of plants under drought. *Ann. Rev. Pl. Physiol.* 15: 363-386.
- MISRA, N. M. and SEN, A. 1981. Effect of pre-sowing seed treatment on yield and yield attributes in wheat (variety Kalyan Sona) under rainfed condition. *Food Fnd. and Agril.* 14 (1 & 2) : 11-13.
- SWAMINATHAN, M. S. 1968. Five year of Research on dwarf wheats. I. A. R. I., New Delhi, pp. 1-48.

Table 2 : Multiple correlation physio-morphological characters and grain yield

Characters	Days to 50% ear emergence	Days to anthesis	Days to maturity	Grain filling period
	1978-79	1978-79	1978-79	1978-79
Grain yield	-0.795*	-0.978**	-0.985**	0.900**
Days to 50% ear emergence		0.692**	0.669*	-0.955**
Days to anthesis			0.904**	-0.965**
Days to maturity				-0.778*
	1979-80	1979-80	1979-80	1979-80
Grain yield	-0.745*	-0.976**	-0.976**	0.790*
Days to 50% ear emergence		0.814**	0.889**	-0.825**
Days to anthesis			0.905**	-0.977*
Days to maturity				-0.782*

* = Significant at 5% level.

** = Significant at 1% level.