

633.11/.13 : 631.5 (541.4)

## SOWING DATES OF WHEAT IN PATNA REGION

1. Wheat growing in India is a gamble with temperature and moisture. The studies on environmental impact on wheat carried out under Phytotron-Hawksbridge (1964), revealed that day temperature of 20°-25°C was very conducive for crop growth. Mean of minimum temperature ranging from 5° to 7°C during crop growth period induces higher tillering. Friend (1965), Asana (1966), Sandhu and Gill (1972) showed that this range of minimum temperature helps in maintaining high net assimilation rate. Earlier work of Nizamuddin and Prasad (1962) has shown that the first fortnight of November was the optimum period of sowing in Bihar plains. However, many farmers feel that high yields are generally obtained when sown a bit late. In this paper an attempt has been made to analyse the effect of different dates of sowing on wheat yield *via* a field experiment for 3 years.

2. Field trials under irrigated condition were conducted for three winter seasons (1981-82 to 1983-84) at the Agricultural Research Institute, Patna (Lat. 25°30' N, Long. 85°15' E and at an altitude of 58.80 m). The soil of the experimental plot was heavy in texture and neutral in reaction. The three dates of sowing were mid-November, first December and mid-December. The treatment plot size was 5 m × 3 m. During 1983-84 season tillers were counted from permanent quadrat of 625 sq. cm (25 cm × 25 cm) fixed in each treatment plots. Tiller counting was started 15 days after sowing (DAS) and continued at 15 days interval till it becomes constant.

In order to study the deviations in weekly mean minimum temperature during crop growth period, standard meteorological weeks 45-48, 49-52, 1-4 and 5-8 corresponding to months of November, December, January and February have been considered for applying "Student's *t*-test". The temperature data available from 1936-37 onwards at the Research Institute, Patna were grouped in clusters of 10 years.

3.1. *Temperature regime* — Studies on the variations in weekly mean minimum temperature data of the last 50 years indicate that there has been a deviation in weekly mean minimum temperature prevailing during the years 1976-85 as compared to earlier periods (1966-67, 1959-65 and 1936-45) of about 10% during November, 1 to 5% during December and January (Table 1).

3.2. *Tillering* — In the first 15 DAS period total tiller number was significantly higher under mid-November (273/m<sup>2</sup>) than under mid-December (226/m<sup>2</sup>) sown crop, low number of tillers in mid-December sown crop might be due to slow rate of crop germination (Table 2). By 30 DAS tillering was significantly better under mid-December (728/m<sup>2</sup>) than crops established on other dates (531-553/m<sup>2</sup>). In this region, maximum number of tillers are produced by 35 DAS [Singh *et al.* (1972)]. In case of mid-December shown crops, this peak tillering phase of the crop coincide with the period of the crop season (mid-January) when weekly mean minimum temperature was less than 10°C, a temperature regime more conducive for tillering (Friend 1965). By 45 DAS, total tiller production in mid-November sown crop fell behind crops sown on other

TABLE 1  
10 years mean of minimum temperature pattern

Met. week	Weekly mean minimum temperature (°C)			
	1976-85	1966-75	1959-65	1936-45
<b>November</b>				
45	17.0	15.9	15.3	15.2
46	15.5	14.4	14.0	13.8
47	15.8	12.3	12.9	10.7
48	13.2	10.6	10.6	9.7
Monthly mean	15.4	13.3	13.2	12.4
S.D.	1.376	2.016	1.725	2.235
' <i>t</i> '	—	1.720	1.994	2.286
Sig. level (%)	—	10	10	10
<b>December</b>				
49	10.9	8.9	10.1	8.9
50	10.4	9.0	9.7	8.2
51	9.4	7.7	8.6	7.5
52	10.8	7.4	8.0	6.3
Monthly mean	10.4	8.3	9.1	7.7
S.D.	0.594	0.711	0.840	0.960
' <i>t</i> '	—	4.533	2.528	4.784
Sig. level (%)	—	1	5	1
<b>January</b>				
1	9.1	7.6	8.2	8.0
2	8.6	8.1	8.0	7.0
3	9.3	6.7	8.4	6.9
4	10.5	8.0	8.1	7.4
Monthly mean	9.4	7.6	8.2	7.3
S.D.	0.671	0.552	0.150	0.433
' <i>t</i> '	—	4.145	3.491	5.265
Sig. level (%)	—	1	5	1
<b>February</b>				
5	10.5	8.3	9.1	8.4
6	9.1	8.5	9.8	8.4
7	11.7	10.1	10.1	9.3
8	12.4	10.8	11.6	10.2
Monthly mean	10.9	9.4	10.2	9.1
S.D.	1.254	1.057	0.914	0.747
' <i>t</i> '	—	1.829	0.902	2.466
Sig. level (%)	—	10	25	5

dates because its peak tillering phase coincide with the period of the season (mid-December) when weekly minimum temperature remained above 10°C. By 90 DAS, first December sown crop produced maximum tillers per unit area (634/m<sup>2</sup>).

3.3. *Grain yield* — Analysed data of 3 years indicates that significant high grain yield (39.57 q/ha) was obtained when crop was sown on first December (Table 2). However, a grain yield of 27.86 q/ha was obtained when the crop was sown in mid-December. Similar trend was obtained in treatment variation during individual years of experimentation except during 1982-83 crop season. During that crop season yield difference between mid-November (31.24 q/ha) and mid-December

TABLE 2

Effect of dates of sowing on tillering in wheat (1983-84) and grain yield variations

Date of sowing	Number of tillers per m <sup>2</sup> (Days after sowing)						Tillers survived (%)	Grain yield (q/ha)			Mean
	15	30	45	60	75	90		1981-82	1982-83	1983-84	
Mid-November (1 Dec)	273 (15 Dec)	553 (1 Jan)	670 (1 Jan)	648 (15 Jan)	555 (1 Feb)	528 (15 Feb)	78.8	33.61	31.24	32.33	32.39
First December (15 Dec)	266 (15 Dec)	531 (1 Jan)	707 (15 Jan)	677 (1 Feb)	645 (15 Feb)	634 (1 Mar)	89.6	42.10	35.68	40.93	39.57
Mid-December (1 Jan)	266 (1 Jan)	728 (15 Jan)	716 (1 Feb)	633 (15 Feb)	619 (1 Mar)	569 (15 Mar)	78.1	24.56	30.36	28.64	27.86
S. Em ( $\pm$ )	4.3	37.3	40.4	35.6	36.9	32.2		1.01	0.53	0.37	1.83
C.D. (5%)	14.8	129.1	NS	NS	NS	NS		3.49	1.82	1.38	6.19

Note : Dates of actual counts are within parenthesis.

(30.36 q/ha) was not significant and relatively lower grain yield under first December sown crop (35.68 q/ha) than other years. This crop season also witnessed a continuous day and night air frost during first fortnight of January 1983.

Thus, from the above results it is concluded that high yields of wheat are obtained in Patna region when sown in the first week of December and prevailing minimum temperatures are favourable for its productivity.

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