Indian J. Plant Physiol., Vol. XXXIV, No. 2, pp. 192-195 (June, 1991)

SHORT COMMUNICATION

QUALITY CONSTITUENTS OF WHEAT AS INFLUENCED BY RATES AND METHODS OF NITROGEN APPLICATION

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Received on 15 Feb., 1990

Protein and gluten contents and water absorbing capacity of wheat (*cv.* Sonalika) was improved by N fertilization, especially by split application of N. Nitrogen applied half as basal dose and half as urea sprays showed maximum enhancement in the above parameters.

Little information is available regarding the biochemical changes, other than protein, in wheat grain due to N fertilization. Hence important quality constituents of wheat grain as modified by rates and methods of N application were investigated.

Wheat *cv.* Sonalika, was grown under field conditions at the farm of C.S. Azad University of Agriculture and Technology, Kanpur during two seasons. Besides no-nitrogen (N_0/T_0), N at two rates, *viz.*, 40 (N_{40}) and 80 (N_{80}) kg/ha, was applied at different stages as under :

T_1—All at sowing
T_2—$\frac{1}{2}$ at sowing+$\frac{1}{2}$ at tillering
T_3—$\frac{1}{2}$ at sowing+$\frac{1}{4}$ at tillering+$\frac{1}{4}$ at flag leaf
T_4—$\frac{1}{2}$ at sowing+$\frac{1}{2}$ at flag leaf
T_5—$\frac{2}{3}$ at sowing+$\frac{1}{3}$ at flag leaf
T_6—$\frac{3}{4}$ at sowing+$\frac{1}{4}$ at flag leaf
T_7—$\frac{1}{2}$ at sowing+$\frac{1}{2}$ as foliar spray

Thus, in all there were 15 treatments, each replicated four times in a randomized block design. A uniform basal fertilization with 40 kg N and 60 kg/ha each of P_2O_5 and K_2O was given. In treatment T_7, 2% urea solution was sprayed at two stages (tillering and flag leaf stages), each spray providing 10 kg N/ha. Protein content in the grain was estimated analysing the total N and multiplying the percentage by factor 5.7 (AOAC, 1965). The gluten content was estimated as

Table I. Quality constituents of wheat flour as influenced by rates and methods of nitrogen application (Average of two years)

Methods of N application	Protein content (%) N rates (kg/ha)			Protein yield (kg/ha) N rates (kg/ha)			Gluten content (%) N rates (kg/ha)			Sedimentation value (ml) N rates (kg/ha)			Starch content (%) N rates (kg/ha)			Total sugars (%) N rates (kg/ha)		
	0	40	80	0	40	80	0	40	80	0	40	80	0	40	80	0	40	80
All basal		13.0	13.6		657	803		10.7	11.2		20.1	24.0		67.2	67.0		3.4	3.2
1/2 B" + 1/2 T		14.3	15.0		812	864		11.5	13.3		23.3	29.8		66.7	66.4		3.3	3.0
1/2 " +1/4 T+1/4 FL		13.2	14.5		683	824		11.3	12.2		21.5	27.7		66.3	66.1		3.3	3.0
1/2 " + 1/2 FL		13.6	15.5		723	805		10.9	12.5		22.7	28.0		66.0	65.8		3.1	3.1
2/3 B" + 1/3 FL		13.9	15.0		749	871		11.4	12.9		24.4	27.0		65.7	65.6		3.3	3.1
3/4 " + 1/4 FL		14.2	15.3		774	914		11.8	13.7		26.4	31.0		65.5	65.4		3.2	3.1
1/2 " + 1/2 FS		14.8	15.6		868	1016		12.0	13.9		27.0	32.0		65.3	65.0		3.2	3.1
Mean	12.1	13.9	14.9	567	752	857	9.8	11.4	12.8	18.5	23.6	28.5	67.7	66.1	65.9	3.6	3.3	3.1

suggested by Swanson (1938). Starch and total sugars were determined by the method of Somogyi (1945) and sedimentation values according to the method of Zeleny (1947) as modified by Pinckney *et al.* (1957).

Protein percentage, protein yield (kg/ha), gluten percentage and sedimentation value increased with N rate while percentages of starch and total sugars had a tendency to decrease at high N rate (Table I). Among the N treatments, T_7 ($\frac{1}{2}$ N as basal + $\frac{1}{2}$N as foliar spray) invariably showed highest percentage of protein and gluten, protein yield and sedimentation value (SV) while differences in starch and total sugar percentage among treatments were negligible. Split application of N was consistently superior to application of entire N as basal for protein, gluten and the sedimentation value (SV) while reverse was the trend in starch and sugar percentage. The data were not consistent between the split applications.

N fertilization has profound effect on increasing wheat protein. Further, under high fertility conditions and split N applications the uptake of N at different growth stages got accumulated in the grain which is reflected in high grain protein (Srivastava and Mehrotra, 1978 and 1980). Maximum grain protein in wheat by applying part of N at sowing and the rest supplied through crop foliage has been reported earlier (Sharma *et al.*, 1666 ; Sadaphal and Das, 1966).

Favourable effects of N fertilization on gluten content in the present study are in accordance with the findings of Jelenic (1965) and Srivastava and Mehrotra (1978). Similarly, Rai and Ram (1964) were of the opinion that for more gluten in wheat the crop should be given N in split doses.

Woodward (1966) and Srivastava and Mehrotra (1978) obtained higher sedimentation units of wheat flour by N fertilizers, while splitting the N dose is superior to all basal N in improving the sedimentation value of wheat flour as has been evidenced by Enikov (1966).

Reduced wheat starch due to N manuring, as noticed here, was also reported by Baumeister (1939) who showed that N promotes growth of additional tissues, in which the carbohydrate produced in photosynthesis is used.

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