"MINERAL NUTRITION OF TRITICALE IN RELATION TO ITS PARENTS"

MOINUDDIN

"Abstract"

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In all, four field experiments were conducted in rabi (winter) season of 1982-85 at the Agricultural Farm of the Aligarh Muslim University, Aligarh. The aim was to select the better performing of the available triticales and to work out their optimum sowing date, seeding rate and basal nitrogen and phosphorus requirements, keeping one cultivar each of wheat and rye (the parents) as check in all the experiments. The criteria for assessing crop performance were based on population count, carried out as number of plants/sq m after one month of sowing; growth characters and leaf-NPK content determined at tillering, heading and milky grain stage of growth; and yield as well as quality attributes studied at harvest. Moreover, in the last (nutrition) experiment, NRA in flag and second leaf was also assayed. Most of the data were significant and are summarised as under.
Experiment 1 (1982-83) was performed according to simple randomised block design to screen eight cultivars of triticale, namely Badger PM 118, Bronco 90 (old cvs.), Delfin, Juppa "S", Mula "S", Muskox "S", Tigre "S" (new CIMMYT cvs.) and TL 419 (new PAU cv.), keeping HD 1982 wheat and Russian Rye as checks. The crop was sown on 10 November, 1982 at the rate of 50 kg seed/ha with a uniform basal fertiliser dressing of N\(_{150}\), P\(_{30}\), K\(_{30}\). Harvesting was undertaken in April, 1983 as and when each cultivar matured. Rye, followed by wheat and Delfin in that order, proved best for population density. However, for most of the growth characters and leaf-NPK contents, Delfin gave the best results. This new triticale either gave the highest value or was at par with the variety giving the highest value for most yield parameters, including grain yield and harvest index in which it equalled wheat. In addition, Delfin also proved best for all the quality parameters, being mostly equalled by Tigre "S" and wheat. On the other hand, Badger PM 118, Bronco 90, Juppa "S" and Mula "S" proved inferior to the remaining four triticales as well as wheat for one or the other growth parameter, leaf-NPK content and yield and quality attributes. Therefore, the better performing triticales (Delfin, Muskox "S", Tigre "S" and TL 419) were selected for the subsequent three experiments.
Experiment 2 (1983-84) was a factorial randomised field trial conducted to work out the optimum out of four sowing dates (25 October, 10 November, 25 November and 10 December) for the selected triticales (Delfin, Muskox "S", Tigre "S" and TL 419), keeping HD 1982 wheat and Russian Rye as checks. Seeding rate was increased to 100 kg seed/ha as more seed became available. A basal fertiliser dose of $N_{150}P_{30}K_{30}$ was applied uniformly. The crop was sown on the specified dates in 1983. Each cultivar was harvested separately on maturity in April, 1984. 10 November proved best while 10 December gave poorest results for growth characteristics, leaf-NPK contents and yield as well as quality attributes. Among varieties rye, followed by wheat and Delfin in that order, gave highest number of plants/sq m. However, Delfin proved the best and rye the poorest for most growth characters, leaf-NPK contents and yield and quality parameters. The interaction 10 November x Delfin proved optimum and 10 December x rye showed lowest performance for most growth characters, leaf-NPK contents and yield and quality characteristics.

Experiment 3 (1983-84) was also laid out according to factorial randomised block design. The aim was to determine the optimum among five seeding rates (50, 75, 100, 125 and 150 kg seed/ha) for the same triticales (Delfin, Muskox "S", Tigre "S" and TL 419), again with HD 1982 wheat and Russian Rye as checks. The crop was sown on 10 November, 1983 with a uniform fertiliser
dose $N_{150}P_{30}K_{30}$. Each cultivar was harvested as and when it matured in April, 1984. Population density increased progressively from 50 to 150 kg seed/ha, whereas the values recorded for growth characters, leaf-NPK contents and most of the yield attributes decreased gradually at each stage with increasing seeding rate. However, grain and straw yield increased with increasing rates upto 125 kg seed/ha but decreased sharply at 150 kg seed/ha. 125 kg seed/ha also gave the highest values for harvest index and most of the significantly affected quality parameters which, however, showed no definite trend. Among different cultivars, Delfin exhibited the highest population density and also proved best for almost all the growth parameters and leaf-NPK contents as well as for most of the yield and quality attributes. Regarding the interaction effects (seeding rate x variety), much variation was noted at each stage. However, 125 kg seed/ha x Delfin proved the best combination for grain yield; 125 kg seed/ha x TL 419 was optimum for straw yield; and 125 kg seed/ha x wheat, equalled by 125 and 75 kg seed/ha x Delfin, gave best results for harvest index.

Experiment 4 (1984-85) also was conducted according to factorial randomised block design to establish the basal nitrogen and phosphorus requirement of the selected triticales (Delfin, Muskox "S", Tigre "S" and TL 419), retaining HD 1982 wheat and Russian Rye as check. All possible combinations of three levels each of nitrogen ($N_{150}$, $N_{200}$ and $N_{250}$) and phosphorus ($P_{30}$, $P_{40}$...
and $P_{50}$) were applied to each variety. The crop was sown in 1984 on 10 November with 125 kg seed/ha (established as optimum sowing date and seeding rate in Experiments 2 and 3 respectively). Treatment $N_{200}P_{40}$ proved best for population count and all the growth, yield and quality parameters. However, 250 kg N/ha ($N_{250}$) with $P_{30}$, $P_{40}$ or $P_{50}$ gave the best value for leaf-N, P or K at different stages. Regarding varietal performance, Delfin gave maximum value for most of the growth, yield and quality parameters, and leaf-NPK contents. Leaf-NRA was also maximum in Delfin in most cases. As regards interaction, $N_{200}P_{40}$ x Delfin gave the highest value for most of the growth, yield and quality parameters as well as for leaf-NRA. However, $N_{250}P_{30}$ x different varieties (including Delfin) gave highest value for leaf-NPK contents in most cases.

Regarding correlation studies (computed in this experiment only), it was determined that growth and yield characteristics as well as NPK contents and NRA in leaf attributed positively to the final yield of the crop and that grain yield of different cultivars could be predicted on the basis of determination of growth characters, leaf-NPK contents and leaf-NRA at different growth stages. Similarly, leaf-NRA could also be used to predict the grain quality of various cultivars tested.

Thus, it is concluded that, out of the eight triticale cultivars, Delfin, Muskox "S", Tigre "S" and TL 419 proved better,
with Delfin giving the best performance. Among the various sowing dates and seeding rates, 10 November and 125 kg seed/ha proved ideal. Lastly, \( N_{200}P_{40} \) (with \( K_{30} \)) proved the optimum basal fertiliser dressing for triticales in general and Delfin in particular for exhibiting their genetic potential with respect to grain yield and quality under the agro-climatic conditions obtaining at Aligarh.