

EFFECT OF NITROGEN, PHOSPHORUS AND FYM ON YIELD AND NUTRIENTS UPTAKE BY BARLEY (*HORDEUM VULGARE L.*)

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SUMMARY

Application of recommended dose of N and P significantly increased the grain and straw yield of barley from 16.92 to 28.30 and from 29.78 to 48.54 q/ha over control and all other treatments of FYM. With the increase in level of FYM from 5 to 10 and 15 t/ha grain yield of barley increased significantly from 18.82 to 21.25 and from 21.25 to 23.74, respectively, and that of straw yield from 32.89 to 36.69 and from 36.69 to 40.83 q/ha, respectively. Application of N and P also significantly increased the N, P and K uptake by grain from 27.92 to 48.96, from 7.95 to 16.98 and from 10.49 to 18.96 kg/ha and by straw from 8.64 to 21.36, 2.68 to 9.81 and from 39.9 to 70.38 kg/ha, respectively, over all other treatments. With the subsequent increase in the level of FYM from 5 to 10 and 15 t/ha subsequently increased the N, P and K uptake by barley grain from 32.18 to 40.83, from 9.03 to 13.05 and from 12.05 to 16.38 kg/ha, respectively, and that of by barley straw from 10.53 to 16.33, from 3.95 to 6.42 and from 47.03 to 62.06 kg/ha, respectively.

Key words : Grain and straw yield, barley, N, P and K uptake

Barley (*Hordeum vulgare L.*) is an important cereal crop of India next to the maize, wheat and rice both in acreage and in production of grain. Barley is cultivated for several purposes like food grain, feed and fodder for cattle and breweries. As a fodder crop, barley has tremendous potential and variation for production of very high amount of digestible dry matter as well as protein. Since long only chemical fertilizers are in use to raise the crops but due to the steep rise in the cost of chemical fertilizers ultimately cost of cultivation also becomes very high. Therefore, now it is the need of the time to think about use of organic manures alone or in combination. Application of organic manures may also improve availability of native nutrients in soil as well as the efficiency of applied fertilizers (Swarup, 2010). Integration of chemical and organic sources and their efficient management showed promising results not only in sustaining the production but also in maintaining soil health (Aulakh, 2011). Among different sources of organic manures, FYM is most important source and used since long as a nutrients supplement to crop production. Barley crop is considered as low fertility requirement crop as compared to high yielding varieties of paddy and wheat. Now-a-days there is a belief to

grow the crops by using only organic manures instead of chemical fertilizers but it needs to be studied either we can harvest a bumper crop by using only organic manures. Therefore, a field experiment was planned to study the effect of recommended dose of N and P through chemical fertilizers and FYM on yield and nutrients uptake in barley.

Field experiment was conducted at research farm, Department of Soil Science, CCSHAU, Hisar (29°05' N, 75°38' E, 222 m elevation) to study the effect of application of recommended dose of N and P through chemical fertilizers and different levels of FYM, on yield and nutrients uptake in barley. Barley variety BH 393 was taken as test crop. Plot size was taken 100 m². Soil of experimental site was sandy loam in texture, having pH 8.2, EC (1 : 2) 0.32 dS/m, OC 0.28 per cent, available N, P and K were 140.8, 16.0 and 285.0 kg/ha, respectively. In all five treatments were maintained (absolute control, three levels of FYM viz., 5, 10 and 15 t FYM/ha and recommended dose of N and P based on soil test report through chemical fertilizers). Randomized block design was followed by keeping three replications. All the P and half of the N were applied through urea and SSP at the time of sowing and remaining half of N

applied at time of first irrigation. FYM was applied one day before sowing. All the field operations such as weeding, irrigation, etc. were done as and when required. Crop was harvested at maturity. Grain and straw yields were recorded separately from each plot. Plant samples (grain and straw) were analysed by following standard procedure in the laboratory. Total N in grain and straw analysed by colorimetric (Nessler's reagent) method (Lindner, 1944) and total P analysed by vanadomolybdo phosphoric yellow colour method (Koenig and Johnson, 1942). Total potassium in grain and straw was analysed by using flamephotometer.

Grain and Straw Yields

Application of N and P significantly increased the grain yield of barley from 16.92 to 28.30 q/ha and straw yield from 29.78 to 48.54 q/ha, respectively, over control and all the levels of FYM (Table 1). Singh and Singh (2005) reported the increase in grain yield of barley with the application of recommended dose of N and P. Kumpawat (2009) also reported the increase in grain and straw yield of barley with the application of recommended dose of N. Kumar *et al.* (2010) reported the increase in grain and straw yield of barley with the application of recommended dose of N and P. Extent of increase in grain yield was 67.26 and 19.21 per cent and in straw yield 63.0 and 18.88 per cent over control and FYM 15 t/ha, respectively. Low yield of barley may be due to the low concentration and slow release of nutrients from FYM as compared to inorganic fertilizers. So, it is clear from the data that we cannot harvest bumper crop of barley only with the application of FYM alone. Application of FYM also increased the barley grain and straw yield significantly over absolute control. With the

TABLE 1
Effect of N and P, and FYM levels on grain and straw yields of barley

Treatment	Yield (q/ha)	
	Grain	Straw
Control	16.92	29.78
FYM 5 t/ha	18.82	32.89
FYM 10 t/ha	21.25	36.69
FYM 15 t/ha	23.74	40.83
N and P on STR	28.30	48.54
C. D. (P=0.05)	1.80	2.45

increase in level of FYM from 5 to 10 and 15 t/ha grain yield of barley increased significantly from 18.82 to 21.25 and from 21.25 to 23.74 q/ha, respectively, and that of straw yield from 32.89 to 36.69 and from 36.69 to 40.83 q/ha, respectively. Thakral and Singh (2002) also reported the increase in grain yield of barley with the application of FYM @ 20 t/ha.

Nutrients Uptake

Application of N and P significantly increased the N uptake by barley grain and straw and increase was observed from 27.92 to 48.96 and from 8.64 to 21.36 kg/ha, respectively, over control and all FYM treatments (Table 2). Singh and Singh (2005) and Kumpawat (2009) also reported the increase in N and P uptake by barley grain and straw with the application of recommended dose of N. Kumar *et al.* (2010) reported the increase in N, P and K uptake by grain and straw of barley with the application of recommended dose of N and P. Application of FYM @ 15 t/ha significantly increased the N uptake by barley grain and straw and

TABLE 2
Effect of N and P, and FYM levels on nutrients uptake by barley

Treatment	Nutrients uptake (kg/ha)					
	N		P		K	
	Grain	Straw	Grain	Straw	Grain	Straw
Control	27.92	8.64	7.95	2.68	10.49	39.90
FYM 5 t/ha	32.18	10.53	9.03	3.95	12.05	47.03
FYM 10 t/ha	36.55	13.94	10.84	5.72	14.24	54.67
FYM 15 t/ha	40.83	16.33	13.05	6.42	16.38	62.06
N and P on STR	48.96	21.36	16.98	9.81	18.96	70.38
C. D. (P=0.05)	3.24	1.79	1.73	1.03	1.33	5.66

increase was observed from 27.92 to 40.83 and from 8.64 to 16.33 kg/ha, respectively, over control and FYM 5 and 10 t/ha, respectively.

As in case of N uptake by barley grain and straw, application of N and P also increased the P uptake by barley grain and straw significantly and increase was observed from 7.95 to 16.98 and from 2.68 to 9.81 kg/ha, respectively, over control and FYM 15 t/ha, respectively. Singh and Singh (2005) and Kumpawat (2009) also reported the increase in N and P uptake by barley grain and straw with the application of recommended dose of N. Application of FYM @ 15 t/ha significantly increased the P uptake by wheat grain and straw and increase was observed from 7.95 to 13.05 and from 2.68 to 6.42 kg/ha, respectively, over control and FYM 5 and 10 t/ha, respectively.

Since nutrients uptake based upon the grain and straw yield, therefore, potassium uptake by barley grain and straw also followed the similar trend as in case of barley yield. Application of N and P significantly increased the K uptake by barley grain and straw and increase was observed from 10.49 to 16.38 and 39.90 to 70.38 kg/ha, respectively, over control and FYM 15 t/ha,

respectively. Kumar *et al.* (2010) reported the increase in N, P and K uptake by grain and straw of barley with the application of recommended dose of N and P. Application of FYM @ 15 t/ha significantly increased the K uptake by barley grain and straw and increase was observed from 10.49 to 16.38 and from 39.90 to 62.06 kg/ha over control and FYM 5 and 10 t/ha, respectively.

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