SUMMARY AND CONCLUSION
CHAPTER-VI
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This chapter enumerates the complete synthesis and extraction of experimental findings of the research work entitled “Effect of integrated plant nutrient-management (INM) on soil and yield of mustard in Alluvial soil of eastern U.P.” The field experiments were carried out during 2003-2004 at Instructional Form of T.D.P.G. college Jaunpur, U.P. derive information on the following parameters as influenced by various INM modules.

6.1 Physiological Characters:

All the treatments were found significantly superior over control with respect to leaf area index (LAI) at 60 DAS. The leaf area index was more pronounced with optimum level of NPK fertilizer along with other nutrient sources against sub optimal level of NPK alone with other nutrient sources against sub optimal level of NPK alone as well as well as with various combinations. Overall treatment T9 (100% NPK + FYM+S) found to be most superior taking this parameter in question.

A significant increase in chlorophyll content of leaves at 60 DAS was recorded in all the treatments over control. Maximum chlorophyll content in leaves was estimated in treatment having 100% NPK+FYM+S followed by 50% NPK+FYM+S. Treatment T+9+ was at par with T+10 and significantly superior over rest of the treatments.
6.2 Agronomical characters:

At 60 DAS, all the treatments were at par in respect to primary branches plant\(^1\). But at 90 DAS all the treatments were significantly superior over control. Treatments \(T_{11}\) (100% NPK=FYM+B) \(T_{10}\) (50% NPK+PYM+S) and significantly superior over the treatments.

A significant increase in seed yield was noted in all the treatments over control. Treatments \(T_3, T_5, T_7, T_9\) and \(T_{11}\) were found significantly superior over 100% NPK alone having 13.02%, 13.37%, 12.5%, 36.92% and 27.46% additional seed yield respectively. Maximum seed yield was noticed in treatment \(T_9\) (100% NPK+FYM+S), with was significantly superior over rest of the treatments. In general the seed yield also.

The harvest index was maximum in treatment \(T_{12}\) followed by \(T_{11}\) and \(T_6\) the values of harvest index were found superior with treatments having 50% NPK as compared to treatments having 100% NPK.

6.2 Quality parameters:

The maximum oil content in seeds was observed under treatment \(T_9\) which was at par with treatment \(T_{10}\) (50% NPK+FYM+S). All the treatments were found significantly superior over control in this regard. Oil content of seeds improved with increasing level of NPK alone or insemination of FYM, B & S.

All the treatments were found significantly superior over control with respect to protein content. Highest protein content was noticed in treatment \(T_9\) (100% NPK+FYM+S) which was at par with treatments \(T_3, T_5, T_7, T_9,\) and \(T_{11}\) and significantly superior with treatments 100% NPK as compared to treatments having 50% NPK.
6.3 **Nutrient concentration in Mustard plant:**

All the treatments were found significantly superior over control at 60 DAS, 90 DAS and at harvest in both seeds and stover, Maximum N content was recorded in treatment T_9 (100% NPK+FYM+S) followed by treatment T_{11}. N content in plants improved with optimal dose of N either alone or in combination with FYM, S and B as compared to sub optimal dose.

Phosphorus and potassium content in plant at 60 DAS, 90 DAS and at harvest in seed and stover improved with increasing levels of NPK either alone or in combination with FYM, S and B. All treatments were significantly superior over control. Maximum P and K content were recorded in treatment T_9 followed by treatment s T_{11}. Application of 100% NPK either alone or in combination with FYM, S & B increasing its content in plant when compared with 50% NPK alone or in combination with other sources.

The maximum S content in plant at various growth stages of crop was noticed in treatment T_9 having 100% NPK+ FYM+ S followed by treatments T_{10}=, T_5 and T_6 addition of FYM and S at to the fertility levels increases the S content in plants significantly.

B Content in plant at DAS was significantly influenced by the application of FYM and B at both fertility levels. Maximum B content in plant was noticed in treatment T_{11}(100% NPK+FYM+B), which was at par with treatments T_3, T_4, T_6 T_8, T_9, T_{10}and T_{12} significantly superior overset of the treatments. Similar behaviors were observed in plant at 90 DAS and at harvest in seeds and stover also.

6.5 **Nutrients uptake by mustard crop:**

The highest uptake of N, P and K was also observed in treatment T_9 which was significantly superior over rest of the treatments. All the
treatments were found significantly superior over control. The uptake of N, P and K by mustard crop increased with increasing levels of NPK applied either alone or in combination with FYM, S and B.

Maximum S and B with drawn by crop was recorded in treatment T_9 and T_{11}. All the treatments were found significantly superior over control in this respect. Application of FYM, S and B either alone or in combination at both fertility levels increases their uptake up to the level of significance.

**6.6 Physico-chemical properties of the soil at harvest of mustard crop:**

The treatments T_3, T_4, T_6, T_8, T_9, T_{10} and T_{12} consisting 100% NPK+FYM, 50% NPK+FYM, 100% NPK+FYM+S, 50% NPK+FYM+S, 100% NPK+FYM+B, 50% NPK+FYM+B, respectively, were observed at par and significantly superior over rest of the treatments with respect to water holding capacity of soil. Maximum water holding capacity of soil was recorded with treatment T_9.

Bulk density reduced with the application of FYM at both fertility levels but the quantum of the reduction was more at higher fertility level. Significant reduction in bulk density was noticed in treatments T_3, T_4, T_6, T_8, T_9, T_{10} and T_{12} over rest of the treatments. Maximum reduction in bulk density was observed in treatment T_9.

The maximum reduction in pH and EC of soil was observed with treatment T_9. Higher reduction in pH and EC was noticed in treatment having FYM and S at both fertility levels. Differences among various treatments were not up to the mark.

Organic carbon content of soil increased significantly in all the treatments having FYM, treatments T_3, T_4, T_6, T_8, T_9, T_{10} and T_{12} were at par
and significantly superior over rest of the treatments. The maximum buildup in organic carbon content of soil was observed with T9. Buildup of organic carbon was slightly more under treatment of 100% NPK in comparison to reduced fertility 50% NPK).

6.7 Availability of nutrients in soil at harvest of mustard crop:

Availability of nitrogen in soil was significantly influenced by both NPK levels and their combination with FYM, S & B alone or together. Maximum available N content was estimated in available N content of soil was observed under all the treatments over control. Higher N availability of soil was noticed under treatments having FYM.

Phosphorus availability in soil under treatments having optimal and suboptimal levels of NPK along with FYM, S, B increased significantly over control. Except control, all the treatments maintained the initial status of phosphorus in soil.

All the treatments were at par in respect to potassium availability of soil after harvest of mustard.

The significant improvement of sulphur availability in soil was noticed under treatments having FYM and S either alone or in combination with other nutrient sources at both fertility levels. Maximum availability was noticed in treatment T9 having 100% NPK+FYLM+S which was at par with T10 (50% NPK +FYLM+S) and significantly superior over rest of the treatments.

B availability in soil under treatments T3, T4, T5, T6, T7, T8, T9, T10 and T12 having FYM or Boron alone in combination at both fertility levels increased significantly over rest of the treatments, Maximum B content
noticed in treatment $T_{12}$, which was at par with $T_{11}$ significantly superior over rest of the treatments.

6.8 Total nutrient content in soil at harvest of mustard crop:

This highest total N content in soil was observed under the treatment $T_3$ having NPK+10t FYM followed by $T_{11}$ (100% NPK =FYM+B) and $T_9$ (100% NPK+FYM+S). Treatment $T_3$ found to be at par with treatments $T_9$ and $T_{11}$ except treatment $T_2$, $T_6$ and $T_8$ rest of the treatments were significantly superior over control.

So far as phosphorus content of soil is concerned except treatments $T_2$, $T_6$, $T_9$ and $T_0$ rest of the treatments were significantly superior over control. The extent of buildup of total P was recorded more in treatment $T_3$ followed by $T_{11}$, $T_9$, and $T_{10}$ Buildup of total P was higher in treatments having 100% NPK in comparison to 50% NPK either alone or along with FYM, S &B.

The maximum buildup of total K$_2$O was observed under treatment $T_3$ having 100% NPK+10t FYM. Increase in total potassium content of soil was noted under some of the treatments over its initial status except in treatments $T_0$, $T_1$, $T_2$, $T_5$, and $T_6$ but differences were not up to the level of significance.

Significant buildup of total sulphur content in soil was observed under treatments $T_5$, $T_6$, $T_9$ and $T_{10}$ having 100% NPK+S, 50% NPK+S, 100% NPK+FYM+S, respectively. Maximum buildup of total S was observed under treatment $T_{10}$ which was significantly superior over all the treatments. Treatments $T_0$, $T_1$, $T_2$, $T_3$, $T_4$, $T_7$, $T_8$ and $T_{12}$ were found to be depleted in total sulphur content of soil over its initial status.

Considerable improvement in total B of soil was recorded under treatments having B at both 100% NPK and 50% NPK levels. Maximum
build up was noticed under treatment $T_{12}$, which was at par with $T_{11}$, $T_8$ and $T_7$. Treatments 50% NPK either alone or in combination with FYM, S & B.

6.10 Economics of the mustard-crop:

The maximum net return Rs. 92.54 was recorded in treatment $T_9$ consisting 100% NPK+FYM+S followed by treatments $T_{10}$, $T_{11}$ and $T_{12}$. Similarly, maximum cost : benefit ratio (0.75) was observed in treatment $T_9$ followed by $T_{11}$. The values of cost benefit ratio and net return were found higher under treatments consisting 100% NPK as compared to treatments having 50% NPK.