

Study the Effect of Integrated Nutrient Management on Yield and Nutrient Uptake in Cabbage

P.K.Singh* and Manoj Pandey**

Abstract

The effect of integrated nutrient management was study on yield and nutrients uptake of cabbage crop on sandy loam soil. The head yield of cabbage crop has increased significantly with application of recommended doses of inorganic fertilizer (NPK) in combination of organic fertilizer along with bio-fertilizer over the control. Among the treatments level, highest head yield (42.42t/ha, mean of two years) was obtained with treatment T₁₂ (100% NPK+ 10 t FYM ha⁻¹+ *Azotobacter*) followed by treatment T₁₀ (100% NPK+ 10 t FYM ha⁻¹) that is economical. Application of 100% NPK+ 10 t FYM ha⁻¹+ *Azotobacter* (T₁₂) recorded significant highest nutrient uptake like, NPK and S, over 50% NPK+ 10 t FYM ha⁻¹+ *Azotobacter* (T₈) except of treatment T₁₀ (100% NPK+ 10 t FYM ha⁻¹). It has also revealed that the protein yield was increased significantly over recommended doses of 50% NPK alone or in combination with organic fertilizer.

Keywords: Cabbage, INM, nutrient uptake, curd yield

Introduction

With the adoption of new technology of intensive cropping with high yielding varieties, there is a considerable demand on soil for supply of nutrients. However, the native fertility of our soils is poor and cannot sustain high crop yields (Ghosh and Hassan 1980). Food and Agricultural Organization advocate an integrated nutrient supply system approach to crop. It is the system, which envisages the use of organic wastes, bio-fertilizers and inorganic fertilizers in judicious combinations to sustain soil productivity.

The conjunctive use of organic and inorganic sources will improve soil health and helps in maximizing production as it involves utilization of local sources and hence, turned to be rational, realistic and economically viable way of supply of nutrients to crop. As nutrients are the major contributing factors their appropriate management practices is essential to achieve the optimum yield of cabbage. The under and above fertilization of integrated nutrient management may lead to poor growth and yield in terms of quality and quantity of cabbage. Therefore, the present study was carried out to see the performance of cabbage crop at varying treatments combinations of organic and inorganic fertilizer in respect of yield; nutrient uptake and protein yield of cabbage crop.

Materials and methods

Field experiments were conducted at Raja Balwant Singh College Research Farm, Bichpuri (Agra) during rabi season of 2000-01 and 2001-02. Twelve treatment combinations were comprising two levels of NPK, (50 and 100 % recommended dose) with FYM (10 t ha⁻¹) and *Azotobacter* (200g culture per liter solution, seedlings of cabbage crop were dipped in culture solution before transplanting) with three replications at different combination including an absolute control laid out in randomized block design. The soil of the experimental field was sandy loam with pH 8.2, organic carbon 4.5kg⁻¹ and available N 170.8 kg ha⁻¹, available P 9.4 kg ha⁻¹, available K 215.6 kg ha⁻¹ and available S 8.3 mg kg⁻¹, respectively. The amount of farmyard manure was supplied well before at transplanting time. The recommended doses of fertilizer have applied in the form of urea, SSP and muriate of potash. Urea was applied in two splits (half as basal and half 30 DAT), full doses of phosphorus and potassium were applied as basal at transplanting time. The seedlings of

Department of Soil science, SASRD, NU, Medziphema-797 116 (Nagaland) *Corresponding author: drpksingh274@rediffmail.com

**Present address: SRF, Indian Institute of Soil Science, Bhopal-462038 (M.P)

cabbage were planted at 15x10 cm spacing in mid December during both the years. Crop was harvested at physiological maturity and yield data recorded. The data was analyzed for different nutrients with adopting standard procedures.

Results and discussions

All the treatments combinations with organic and inorganic fertilizers were recorded significantly higher cabbage head yield over the control, except treatment (T₃), where cabbage seedlings were inoculated with *Azotobacter* (Table 1). Head yield varied from 24.95-42.80 t ha⁻¹ and 25.04-42.05 t ha⁻¹ during 2000 and 2001, respectively. Highest head yield (42.42 t ha⁻¹, mean of two years) of cabbage head was recorded with the treatment T₁₂ (100% NPK+ 10 t FYM ha⁻¹+ *Azotobacter*) followed by treatment T₁₀ (41.0 t ha⁻¹), T₁₁ (39.95 t ha⁻¹) T₉ (39.34 t ha⁻¹) and T₈ (38.10 t ha⁻¹). Similar result was found by Warade *et al.* (1995). It has also revealed that the addition of organic fertilizers above 100 % NPK alone, or in combination of organic fertilizers, did not increased significant yield. However, above 50% NPK in combinations of FYM and bio-fertilizer (100% NPK+ 10 t FYM ha⁻¹+ *Azotobacter*) yield was increased. In regard of protein yield, table 1 indicated that all the treatment combinations were having significantly more protein yield over the control. Significantly highest protein yield (383.3 & 374.4 kg ha⁻¹) was obtained by the treatment T₁₂ (100% NPK +10 t FYM + *Azotobacter*) in respective years. It varied from 142.8-383.3 kg ha⁻¹ and 142.6-374.4 kg ha⁻¹ during 2000 and 2001, respectively. These data also indicate that protein yield was significantly increased with *Azotobacter* or with 10 t FYM ha⁻¹ in alone or both in combination with 50% NPK or with 100 % NPK, respectively.

All the treatment combinations were recorded significantly more nutrient uptake (N) than the control except treatment (T₃), where cabbage seedlings were inoculated with *Azotobacter*. It has also revealed that 100% NPK alone or in combination with organic fertilizers yielded significantly higher nutrient uptake than 50% NPK alone or in combination of organic fertilizers in both the years (Table 2). Significantly highest nitrogen uptake was obtained with treatment T₁₂

(100% NPK+ 10 t FYM ha⁻¹+ *Azotobacter*) except of treatment T₁₀ (100% NPK+ 10 t FYM ha⁻¹). It varied from 22.99-61.20 kg ha⁻¹ and 22.89-60.14 kg ha⁻¹ during 2000 and 2001, respectively. Total phosphorus uptake was also recorded in the entire treatment combinations significantly higher nutrient uptake over the control except treatment (T₃). Highest phosphorus uptake was obtained with treatment T₁₂ (100% NPK+ 10 t FYM ha⁻¹+ *Azotobacter*). It varied from 5.09-14.21 kg ha⁻¹ and 4.70-13.23 kg ha⁻¹ during 2000 and 2001, respectively. Singh *et al.* (1996) also reported similar results.

All the treatment combinations were recorded significantly more nutrient uptake (K) over the control except the treatment T₃ (*Azotobacter*). Highest nutrient uptake was obtained with treatment T₁₂ (100% NPK+ 10 t FYM ha⁻¹+ *Azotobacter*) that is at par with treatment T₁₀, T₁₁ and T₉. It varied from 22.23-52.91 kg ha⁻¹ and 21.94-52.35 kg ha⁻¹ during 2000 and 2001, respectively.

In pursuance of total sulphur uptake, all the treatment combinations were recorded significantly more nutrient uptake (S) over the control except the treatment T₃ (*Azotobacter*). It varied from 4.87-16.24 kg ha⁻¹ and 4.67-15.44 kg ha⁻¹ during 2000 and 2001, respectively.

The increase in the uptake of nutrients by cabbage head with application of NPK along with FYM is obvious as it is considered as a storehouse of plant nutrients, which provide optimum nutrients for crop. These results are in agreement with finding of Vachhani and Patel (1991).

References

- Ghosh AB and Hassan R (1980). Effect of integrated nutrient management on yield of onion crop an alluvial soil. Fertilizer News 25: 19-23
- Singh Harendra, Singh Sandeep and Singh Vinay (1996). Response of onion (*Allium Cepa L.*) to nitrogen and sulphur. Annals of Agricultural Research 17: 441-444
- Vachhani MU and Patel ZG (1991). Bulb yield quality of onion as influenced by levels of nitrogen, phosphorus and potash under south Gujrat condition. Progressive Horticulture 23: 55-56

Warade SD, Desale SB and Shinde KG (1995).
Effect of organic, inorganic and bio-fertilizers
on yield of onion bulbs. *Journal of Maharashtra
Agricultural University* 20: 467-46

