

## Effect of organic and inorganic sources of nitrogen on quality of cabbage (*Brassica oleracea* var. *capitata* L.)

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### ABSTRACT

A field experiment was conducted during *Rabi*, 2008-2009 at Horticulture Nursery, College of Agriculture, Gwalior (M.P.). The result of the experiment revealed that Application of organic manures either alone or in combination with urea enhanced the quality attributes in cabbage over control. Highest nitrogen content in leaves (3.50%) and protein content in head (15.11%) of cabbage have been recorded with the application of nitrogen 50% through urea + 50% through vermicompost followed by the application of nitrogen 50% through urea + 50% through poultry manure. The lowest nitrogen content in leaves (2.13%) and protein content in head (12.10%) were recorded in control. The maximum vitamin C content (36.12 mg/100 g<sup>-1</sup> edible part) was recorded with the application of nitrogen 50% through urea + 50% through vermicompost followed by 50% N through urea + 50% N through poultry manure, 50% N through urea + 25% through vermicompost + 25% N through poultry manure, 75% N through urea + 25% N through vermicompost, 50% N through urea + 50% N through FYM and 75% N through urea + 25% N through poultry manure without significant margin.

**Key words :** Vermicompost, Poultry manures, Nitrogen, Protein, Vitamin C

### INTRODUCTION

Cabbage (*Brassica oleracea* var. *capitata* L.) is one of the most important vegetable crop grown all around the world in more than ninety countries. It is cruciferous vegetable crop, which originated from western Europe and north shores of Mediterranean sea region. Being an important winter vegetable crop in India, it is grown in 0.25 m ha, with 6.1 tonnes production. While in M.P. it covers approximately 2820 hectare area with 56400 tonnes production and 20 t/ha productivity (Agricultural statistics, 2004). Nitrogen increases the growth and yield of most of the crops, particularly leafy vegetable including the cabbage. Application of nitrogen through inorganic fertilizers can enhance the growth and yield to considerable extent but the soil fertility and productivity cannot be retained for a longer period. Therefore, it is important to supplement the urea with inorganic sources of nitrogen. In India, it is more important owing to the availability of sufficient FYM, vermicompost and poultry manure in mixed farming system. Keeping all these points in mind, an investigation was conducted to evaluate the effect of organic and inorganic sources of nitrogen on quality of cabbage.

### MATERIALS AND METHODS

A field experiment was conducted during *Rabi*, 2008-2009 at Horticulture Nursery, College of Agriculture, Gwalior (M.P.). The experiment was laid out in Randomized Block Design having 17 treatments of

integrated application of nitrogen including control with 3 replications. The treatments consisted of T<sub>1</sub> (Control), T<sub>2</sub> (100% N through urea), T<sub>3</sub> (75% N through urea + 25% N through FYM), T<sub>4</sub> (50% N through urea + 50% N through FYM), T<sub>5</sub> (25% N through urea + 75% N through FYM), T<sub>6</sub> (100% N through FYM), T<sub>7</sub> (75% N through urea + 25% N through vermicompost), T<sub>8</sub> (50% N through urea + 50% N through vermicompost), T<sub>9</sub> (25% N through urea + 75% N through vermicompost), T<sub>10</sub> (100% N through vermicompost), T<sub>11</sub> (75% N through urea + 25% N through poultry manure), T<sub>12</sub> (50% N through urea + 50% N through poultry manure), T<sub>13</sub> (25% N through urea + 75% N through poultry manure), T<sub>14</sub> (100% N through poultry manure), T<sub>15</sub> (50% N through urea + 25% through FYM + 25% N through vermicompost), T<sub>16</sub> (50% N through urea + 25% through FYM + 25% N through poultry manure) and T<sub>17</sub> (50% N through urea + 25% through vermicompost + 25% N through poultry manure). Golden Arce variety was used in experiment. The randomization of treatment was done with the help of random number table (Fisher, 1950) in 51 plots. The seeds were treated with Thiram @ 2.0 gm kg<sup>-1</sup> seed to check the damping off and other seed borne diseases. Seeds @ 10 gm bed<sup>-1</sup> were sown in shallow furrows prepared at 10-12 cm apart by dropping the seeds at 5-7 cm apart and at 1.5-2 cm depth. Six weeks old seedlings of cabbage were transplanted on 27<sup>th</sup> October, 2009 when average height of seedlings was about 10 cm. The distance between plant to plant as well as row to row was kept at 45 cm. Nitrogen was applied at the rate

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of 120 kg ha<sup>-1</sup> as per recommendation. As per the treatment, nitrogen was supplied through FYM, vermicompost, poultry manure and urea. A full dose of FYM, vermicompost, poultry manure were applied at the time of transplanting, while urea was applied in two split doses *i.e.* half at the time of transplanting and remaining half dose 30 days after transplanting. Phosphorus and potash were applied as basal in all plots @ 80 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> and 60 kg ha<sup>-1</sup> K<sub>2</sub>O through SSP and MoP, respectively. The samples collected at harvest from each plot were dried and thereafter ground to a fine powder for estimating nitrogen content. Nitrogen content was estimated by Nessler's reagent in colorimetric method (Snell and Snell, 1939). Protein content in fruit was calculated by multiplying nitrogen per cent in head by the factor 6.25 (AOAC, 1960). Whereas nitrogen per cent in head was calculated with the help of standard procedure. For taking a representative sample, four heads from each plot were taken at random and homogenous fresh samples were prepared for ascorbic acid estimation. The estimation was done according to AOAC (1960).

## RESULTS AND DISCUSSION

Data in Table 1 revealed that Nitrogen content in leaves, protein and vitamin C content in head were increased significantly with the application of organic sources of nitrogen along with urea as compared to control. Application of nitrogen 50% through urea + 50% through vermin-compost exhibited maximum nitrogen content of 3.50 per cent in leaves, protein content of 15.11 per cent in head and vitamin C content of 36.12 mg100g<sup>-1</sup> in head of cabbage. It might be due to improved nutritional environment in the rhizosphere as well as its utilization in the plant system leading to enhanced translocation of nutrient vitamin and protein in head. The nitrogen might have been utilized in greater quantity due to their abundant availability. Another region might be the application of organic source might have significantly enhanced the availability of native and applied macro and micronutrients in the soil, as consequence of which the quality would have increased. Similar type of finding was reported by Mahendran and Kumar (1997), Prabhakaran and Pitchai (2002), Prabhakaran and Pichai (2003) and Ghuge *et al.* (2007).

**Table 1 : Effect of organic and inorganic sources of nitrogen on vitamin C, nitrogen content in leaves and protein content in head of cabbage**

Treatments	Symbol	Nitrogen content in leaves (%)	Protein content in head (%)	Vitamin C content (mg100g <sup>-1</sup> )
Control	T <sub>1</sub>	2.13	12.10	25.44
100% N (urea)	T <sub>2</sub>	2.63	13.84	30.10
75% N (urea) + 25% N (FYM)	T <sub>3</sub>	2.60	13.71	28.87
50% N (urea) + 50% N (FYM)	T <sub>4</sub>	2.18	14.09	32.70
25% N (urea) + 75% N (FYM)	T <sub>5</sub>	2.53	13.31	27.70
100% N (FYM)	T <sub>6</sub>	2.43	12.73	27.12
75% N (urea) + 25% N (VC)	T <sub>7</sub>	2.68	14.20	33.67
50% N (urea) + 50% N (VC)	T <sub>8</sub>	3.50	15.11	36.12
25% N (urea) + 75% N (VC)	T <sub>9</sub>	2.64	13.84	30.10
100% N (VC)	T <sub>10</sub>	2.53	13.33	28.31
75% N (urea) + 25% N (PM)	T <sub>11</sub>	2.70	13.89	31.63
50% N (urea) + 50% N (PM)	T <sub>12</sub>	3.29	14.41	34.80
25% N (urea) + 75% N (PM)	T <sub>13</sub>	2.60	13.63	28.80
100% (PM)	T <sub>14</sub>	2.53	13.06	27.62
50% N (urea) + 25% N (FYM) + 25% (VC)	T <sub>15</sub>	2.64	13.70	30.19
50% N (urea) + 25% N (FYM) + 25% (PM)	T <sub>16</sub>	2.57	13.50	29.59
50% N (urea) + 25% N VC + 25% (PM)	T <sub>17</sub>	2.93	14.24	34.06
S.E. (±)		0.10	0.29	1.70
C.D. (P=0.05)		0.29	0.83	4.91

VC = Vermicompost, PM = Poultry manure

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