



INFLUENCE OF ORGANIC AND INORGANIC FERTILIZER ON NUTRIENT CONTENT IN BROCCOLI (*BRASSICA OLERACEA* VAR. *ITALICA*).

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Abstract

An experiment entitled “Influence of organic and inorganic fertilizer on nutrient content in broccoli” was carried out at the site for “Network Project on Bio fertilizer” in the campus of College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar during *rabi* 2008-09 and 2009-10. Results revealed that out of ten treatments tried, the T_{10} i.e. 75% NP+ 100% K+ bio inoculants+ VC (5t/ha) proved to be the best on account of nitrogen, phosphorous, potassium, calcium, magnesium and sulphur content of curd . The NPK content of curd was highest in T_{10} (60.92 kg/ha, 6.99 kg/ha and 34.36 kg/ha). The calcium, magnesium and sulphur content in curd were also highest in T_{10} (11.84 kg/ha, 14.52 kg/ha and 8.68 kg/ha), respectively.

Key words : Biofertilizer, curd, FYM, NPK, vermicompost.

Introduction

Broccoli (*Brassica oleracea* L. var *italica*) is a member of the family Brassicaceae and is a native of Mediterranean region. It is a recent introduction to India and is becoming popular among the rich people because of its low fat content, low in calories, high vitamin C and good source of vitamin A, B₂ and calcium (Sanwal and Yadav, 2005). Maximum amount of β - carotene is stored in the florets, but there is a plenty of nutrition like calcium, iron, thiamine, niacin and vitamin C in its stalk. Broccoli contains a compound Glucoraphanin that can be processed into an anti cancer compound Sulphoraphane. It also contains Indole-3-carbinol, a chemical which boost DNA repair in cells and appears to block the growth of cancer cells.

Materials and Methods

The present experiment entitled “Influence of organic and inorganic fertilizer on nutrient content in broccoli” was carried out at “Network project on Bio fertilizer” in the campus of College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar during *Rabi* 2008-09 and 2009-10 in Randomized block design with

10 treatments replicated thrice. The individual plot size was 3m × 2.8m having a spacing of 50cm × 40cm. The total area of the experimental plot was 367.92 m². Puspaa (F₁ hybrid, Seminis company) variety of broccoli was taken for the trial. General recommendation of fertilizer used for the experiment was 120:30:60 of NPK (kg/ha) including bio fertilizer *Azotobacter*, *Azospirillum*, PSB in the ratio of 1:1:1. Besides bio fertilizer FYM 10 t/ha and vermicompost 5 t/ha were also used as per the treatments. However, the detail treatments are given below.

S. no.	Notation	Treatments
1	T ₁	Absolute control
2	T ₂	100% NPK
3	T ₃	100% NPK +100% FYM
4	T ₄	100% NPK + 100% V.C
5	T ₅	100% NPK +50%FYM +50% VC
6	T ₆	100% NPK +50%FYM+25% VC+25% VC
7	T ₇	100% NPK +50% V.C +50%VC
8	T ₈	100% NPK + 50%V.C +25%VC+25%VC
9	T ₉	75%NP+100% K+Bioinoculant+100% FYM
10	T ₁₀	75% NP+100% K +Bioinoculant+100% VC

Table 1 : Influence of organic and inorganic fertilizer on 'N' content of the broccoli curd.

S. no.	Treatments	N content of curd (kg/ha)		
		2008-09	2009-10	Pooled
1	Absolute control	2.91	3.11	3.01
2	100% NPK	23.38	20.96	22.17
3	100% NPK +100% FYM	33.35	35.08	34.21
4	100% NPK + 100% VC	42.03	45.97	44.00
5	100% NPK +50%FYM +50% VC	44.01	46.43	45.25
6	100% NPK +50%FYM + 25% VC +25% VC	44.30	51.48	47.88
7	100% NPK +50% V.C +50%VC	49.77	54.67	52.22
8	100% NPK + 50%V.C +25%VC +25%VC	56.07	56.24	56.16
9	75%NP +100% K+ Bioinoculant+100% FYM	56.35	58.13	57.24
10	75 % NP + 100% K + Bioinoculant + 100% VC	60.93	60.91	60.92
	SEM±	0.34	0.32	0.19
	CD(0.05)	1.02	0.96	0.54

Table 2 : Influence of organic and inorganic fertilizer on 'P' content of the broccoli curd

S. no.	Treatments	P content of curd (kg/ha)		
		2008-09	2009-10	Pooled
1	Absolute control	0.23	0.34	0.29
2	100% NPK	1.88	1.70	1.79
3	100% NPK +100% FYM	2.98	3.16	3.07
4	100% NPK + 100% V.C	3.88	3.58	3.73
5	100% NPK +50%FYM +50% VC	4.14	4.01	4.08
6	100% NPK +50%FYM + 25% VC +25% VC	4.63	5.07	4.85
7	100% NPK +50% V.C +50%VC	4.81	5.15	4.98
8	100% NPK + 50%V.C +25%VC +25%VC	4.82	5.43	5.13
9	75%NP +100% K+ Bioinoculant+100% FYM	5.78	6.04	5.91
10	75 % NP + 100% K + Bioinoculant + 100% VC	5.44	7.37	6.99
	SEM±	0.38	0.31	0.18
	CD(0.05)	1.12	0.92	0.53

Table 3 : Influence of organic and inorganic fertilizer on 'K' content of the broccoli curd.

S. no.	Treatments	K content of curd (kg/ha)		
		2008-09	2009-10	Pooled
1	Absolute control	1.05	1.32	1.19
2	100% NPK	10.78	12.81	11.79
3	100% NPK +100% FYM	13.16	15.12	14.14
4	100% NPK + 100% V.C	7.63	21.18	19.41
5	100% NPK +50%FYM +50% VC	18.86	21.12	19.99
6	100% NPK +50%FYM + 25% VC +25% VC	23.03	24.89	23.96
7	100% NPK +50% V.C +50%VC	25.83	26.72	26.28
8	100% NPK + 50%V.C +25%VC +25%VC	29.88	32.76	31.32
9	75%NP +100% K+ Bioinoculant+100% FYM	30.79	33.97	32.38
10	75 % NP + 100% K + Bioinoculant + 100% VC	33.72	34.99	34.36
	SEM±	0.36	0.35	0.26
	CD(0.05)	1.07	1.04	0.73

Table 4 : Influence of organic and inorganic fertilizer on 'Ca' content of the broccoli curd.

S. no.	Treatments	Ca content of curd (kg/ha)		
		2008-09	2009-10	Pooled
1	Absolute control	0.47	0.48	0.48
2	100% NPK	5.8	6.23	6.02
3	100% NPK +100% FYM	8.01	8.11	8.06
4	100% NPK + 100% V.C	8.12	8.25	8.19
5	100% NPK +50%FYM +50% VC	8.98	8.99	8.98
6	100% NPK +50%FYM + 25% VC +25% VC	9.46	9.34	9.4
7	100% NPK +50% V.C +50%VC	9.7	9.82	9.76
8	100% NPK + 50%V.C +25%VC +25%VC	10.98	11.08	11.03
9	75%NP +100% K+ Bioinoculant+100% FYM	11.02	11.4	11.21
10	75 % NP + 100% K + Bioinoculant + 100% VC	11.77	11.91	11.84
	SEM±	0.32	0.35	0.18
	CD(0.05)	0.95	1.05	0.49

Results and Discussion

The data presented in table 1 recorded the maximum 'N' content of the curd in T_{10} (60.93kg/ha and 60.91 kg/ha) which was statistically significant than all other treatments tried in the experiments followed by T_9 (56.35 kg/ha and 58.13 kg/ha) for the year 2008-09 and 2009-

10. Similarly, as per table 2, 'P' content of the curd was recorded to be highest in T_{10} (5.44 kg/ha and 7.37 kg/ha) during 2008-09 and 2009-10 respectively. In table 3, maximum 'K' content of curd during 2008-09 and 2009-10 was (33.72 kg/ha and 34.99 kg/ha). In table 4 'Ca' content of curd was maximum in T_{10} during 2008-09 and

Table 5 : Influence of organic and inorganic fertilizer on 'Mg' content of the broccoli curd.

S. no.	Treatments	Mg content of curd (kg/ha)		
		2008-09	2009-10	Pooled
1	Absolute control	0.17	0.24	0.21
2	100% NPK	2.08	2.95	2.51
3	100% NPK +100% FYM	2.94	3.82	3.38
4	100% NPK + 100% V.C	7.47	7.29	7.38
5	100% NPK +50%FYM +50% VC	8.68	8.71	8.69
6	100% NPK +50%FYM + 25% VC +25% VC	7.11	9.22	8.17
7	100% NPK +50% V.C +50%VC	9.45	9.87	9.66
8	100% NPK + 50%V.C +25%VC +25%VC	14.23	10.94	12.59
9	75%NP +100% K+ Bioinoculant+100% FYM	14.79	14.24	14.52
10	75 % NP + 100% K + Bioinoculant + 100% VC	11.77	11.91	11.84
	SEM±	0.24	0.33	0.31
	CD(0.05)	0.70	0.98	0.87

2009-10 (11.77 kg/ha and 11.91 kg/ha). Similarly, in table 5 'Mg' content of plant was highest in T₁₀ (14.79 kg/ha and 14.24 kg/ha). In table 6, the 'S' content was found to be highest in T₁₀ i.e. 8.66 kg/ha and 8.7 kg/ha during 2008-09 and 2009-10, respectively.

Application of nutrients as well as Biofertilizer with organic manures has increased the productivity of broccoli crop as observed in the investigation carried out in 2008-09, 2009-10. Chemical fertilizers particularly nitrogen may be available to the plant in some quantity. But the major portion may leach inside the soil. Whereas, phosphorous and potassium will remain in bound form in the soil, which will be gradually available to the crop. Biofertilizer act as a chelating agent for different nutrients except nitrogen, which will be made available in sufficient quantity to the plant and in turn be utilized and produce maximum yield. The highest values of nutrients with respect to NPK were recorded by applying 75% NP+100% K+ Biofertilizer+ Vermicompost to broccoli crop. Schuphan (1974) reported that efficiency of inorganic fertilizers was pronounced when they were applied combinedly with Biofertilizer in presence of organic source in vegetable crops. The maximum availability of NPK individually / synergistically resulted increase in vegetative growth finally increased the nutrient content and ultimately yield. The result confirmed the earlier result of Evaraats *et al.* (1997) in broccoli, Sable and Bhamare (2007) in cauliflower, Sharma (2007) in broccoli and Ranwat *et al.* (2008) in

Table 6 : Influence of organic and inorganic fertilizer on 'S' content of the broccoli curd.

S. no.	Treatments	S content of curd (kg/ha)		
		2008-09	2009-10	Pooled
1	Absolute control	0.35	0.29	0.32
2	100% NPK	1.97	2.94	2.46
3	100% NPK +100% FYM	4.17	4.78	4.48
4	100% NPK + 100% V.C	5.76	5.20	5.48
5	100% NPK +50%FYM +50% VC	6.04	6.74	6.39
6	100% NPK +50%FYM + 25% VC +25% VC	6.13	7.42	6.78
7	100% NPK +50% V.C +50%VC	6.86	7.62	7.24
8	100% NPK + 50%V.C +25%VC +25%VC	7.11	7.73	7.42
9	75%NP +100% K+ Bioinoculant+100% FYM	7.87	7.82	7.84
10	75 % NP + 100% K + Bioinoculant + 100% VC	8.66	8.7	8.68
	SEM±	0.29	0.28	0.18
	CD(0.05)	0.86	0.84	0.50

broccoli. Application of inorganic fertilizers mixed with Biofertilizer in presence of vermicompost has increased the productivity of broccoli as observed in the investigation. Nutrients particularly; Calcium, Magnesium and Sulphur were readily available to the plant as per their requirement. The biofertilizer, which acted as a chelating agent whereby different nutrients made available to the plant which was utilized properly and produce maximum yield. The highest value with respect to calcium, magnesium and sulphur were recorded when 75% NP + 100% K combined with biofertilizer in presence of organic source (vermicompost) applied to broccoli crop. The maximum availability of the major nutrients including calcium, magnesium and sulphur individually or synergistically resulted in increasing the vegetative growth and ultimately the yield. Similarly, positive results were also found by Sharma and Chandra (2004) in cauliflower.

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