

Effect of Organic sources of nutrition on cabbage production in Arunachal Pradesh

ABSTRACT

The present investigation was carried out during Rabi season of 2017-18 and 2018-19 respectively in Tirap district of Arunachal Pradesh to find out the best doses of Rock phosphate and FYM for cabbage production. Total three treatments-T₁ (Rock phosphate@ 375 Kg/ha + FYM @ 10 Tonnes/ha), T₂ (Rock phosphate@200Kg/ha + FYM @ 10 Tonnes/ha) and T₃ (Control-no use of any manure & fertilizer) were replicated thrice during both the years of study. The T₃ resulted maximum in all parameters viz. - maximum plant height (31.4 cm), average weight of head (304.7 gm), total yield (162.8q/ha) and marketable yield (149.3 q/ha) while control yielded minimum.

Keywords: *Cabbage, Rock phosphate, FYM,*

INTRODUCTION

Being a staple crop in the wintertime, cabbage (*Brassica oleracea* L. var. *capitata*) is rich in vitamins, minerals, fibre, and other nutrients and has some therapeutic benefits as well. However, because it feeds heavily, cabbage draws more nitrogen, phosphorus, and potassium from the soil. The overuse of chemical fertilizers, insecticides, herbicides, and other agricultural chemicals has had a negative impact on soil fertility, biodiversity, produce quality, and human health in modern agriculture. Furthermore, there is evidence that throughout the past 60 years, intensive agriculture has led to a decrease in the number of vitamins and minerals found in fresh fruits and vegetables. Together with enhancing soil health, growth, yield, and quality, the use of organic manures and biofertilizers helps steer clear of chemical-based farming. (Sankaran, 1996; Sarkar, 2001; Bahadur *et al.* 2003; Sable and Bhamare, 2007).

According to several studies (Warman and Havard, 1997; Worthington, 2001; Magkos *et al.* 2003; Bahadur *et al.* 2003, 2004), foods cultivated organically are healthier and contain more vitamins and minerals than conventional crops. They also preserve veggies better when stored at room temperature. (Vogtmann *et al.* 1993; Singh, 2006; Umlong, 2010). Compared to conventionally produced crops, organically cultivated crops showed a higher dry matter content (Fjelkner-Modig *et al.* 2000; Ghuge *et al.* 2007). A substantial body of research has been conducted, and it has been shown that applying organic amendments and biofertilizers together or separately improved yield, affected qualitative characteristics, and improved soil health in a number of vegetable varieties (Worthington, 2001; Bahadur *et al.* 2003; 2004). Unfortunately, there is a dearth of knowledge on the impact of organic manures and biofertilizers on cabbage quality, which is why the current study was conducted.

In eastern parts of Arunachal Pradesh, cabbage grows during the winter season. It is high in fiber & minerals, low in fat, high in foliate, water & vitamin C. It processes high nutritional density which protect a wider range of disease from cancer to cataract. It also supplies Potassium and calcium too to human body.

In Tirap district of Arunachal Pradesh; farmers do not use any type of chemical fertilizers by default. This leads to low productivity of cabbage and all vegetables. Though different agencies like Dept of Agriculture/Horticulture/Krishi Vigyan Kendra has done a lot of effort to educate farmers about scientific way to application of organic and inorganic fertilizers. Besides that, farmers could not adopt as much needed. The vegetable crop declined due to low fertility level of soil. The organic manuring can play a vital role in sustaining soil fertility and crop production. It is a well known fact that inorganic fertilizers are not a positive sign to crop production, soil and human health, ecology too. The integrated nutrient management is the best way to maintain the soil fertility as well as food quality too.

Material and Methods-

The severity of problem regarding improper/not using of organic fertilizers was reported 40 % in the district. To keep in all these facts, the Krishi Vigyan Kendra Tirap, Deomali-Arunachal Pradesh conducted On Farm Trials (OFT) in Rabiseason of 2017-18. And 2018-19. Respectively. The OFT conducted in five location (0.10 ha) in five selected villages namely -Lekhi village, Nutan Basti, Noitong, Mopaya and makat. All these selected farmers were educated through training program. The soil of the district is silt clay loam type having pH 5.8 (based on soil testing result in KVK Tirap). The plot size of every selected farmer was 0.02 ha. The fields were weed free, well ploughed & levelled.

The Randomized Block Design with three (03) treatments and three (03) replications were applied. The first Treatment details are as follows- T₁ (Rock phosphate @ 375 Kg/ha + FYM @ 10 Tonnes/ha), T₂ (Rock phosphate @ 200 Kg/ha + FYM @ 10 Tonnes/ha) and T₃ (Control-no use of any manure & fertilizer). Rock phosphate in powdered form @ 375 Kg/ha was applied during last ploughing. Golden Acre variety was growing at Nursery of Krishi Vigyan Kendra- Tirap during second week of October, 2017. The 25 days old seedlings were distributed to every selected farmer and transplanted @ 45 cm x 30 cm spacing, during the 1st week of November, 2017 and 2018 respectively. All the scientific package and practices were applied during the crop duration.

Tableno.1:SoilcompositionofTirapdistrict, Arunachal Pradesh

SoilCharacteristics	Analyticalvalue
PhysicalProperties	
Sand	17.1 %
Silt	47.3%
Clay	35.6%
Texture	Siltclayloam
Bulkdensity	1.4gm/cm ³
Particledensity	2.6gm/cm ³
ChemicalProperties	
SoilpH	5.8
Total N(%)	0.058%
Organiccarbon(%)	0.8 %
C:Nratio	13.79
AvailableP ₂ O ₅ (ppm)	12

In Arunachal Pradesh three types of Agro-climatic zones are prevails. the Tirap district falls under Eastern Himalayan Region (Zone II), Sub region:- Per Humid Hyper Thermic Foothills; where hot and humidity is very common characteristics. The rains start from End of February and continue up to September. The intermediatory dry spells are often occurs which are very heat and humid.

Table 2 :The weather during the research period

Month	Rainfall(mm)		Temperature °C				Relative Humidity (%)			
	2017	2018	2017		2018		2017		2018	
			Max.	Min.	Max.	Min.	M	E	M	E
April- 2017	247	186.0	34.4	12.2	35.2	13.2	82	67	81	65
May- 2017	327	117.5	35.6	14.6	36.7	15.1	86	73	89	75
June-2017	241	433.4	36.8	16.5	37.7	17.2	91	80	93	82
July-2017	347	336.6	34.2	18.4	35.4	18.9	93	83	95	81
August-2017	493	277.3	33	19.1	34.2	20.1	87	85	89	87
September-2017	371	186.2	32.3	18.8	33.6	20.1	88	84	91	86
October-2017	162	118.0	26.5	17.2	27.4	18.4	89	90	92	92
November-2017	7.6	15.4	25.1	12.3	25.9	14.1	87	82	89	88
December-2017	0	0	25.8	9.4	26.2	10.2	85	83	86	87
January-2018	12.2	12.7	25.4	8.6	26.2	9.1	85.7	88	84.9	88
February-2018	69.6	69.0	26.1	7.9	26.9	8.3	88	90	83	92
March-2018	138.2	123.0	28.7	8.8	29.1	9.2	85	81	82	83

Where Max. denotes maximum, min. denotes minimum, M denotes Morning, E denotes evening

Results and Discussion-

The T1 recorded maximum plant height (31.4 cm) followed by T2 (29.7 cm) meanwhile control was the minimum (26.5 cm). The significant variation 1.87 was observed regarding plant height of cabbage when two different doses of rock phosphate with manure were applied in soil. Under the treatment control; where no rock phosphate and manures were applied; the result was minimum. The organic manures improve the water holding capacity, availability of nutrient supply, soil porosity, cation exchange capacity of soil; which resulted into better result; where it had applied in sufficient amount (Gomez and Gomez,1984).

The weight of head was maximum (304.7 g) recorded with T1 followed by T2 (268.2 g) while the control was poorest (219.1 g). The combined effect of rock phosphate and manures exhibited remarkable positive result in head weight of cabbage. The organic fertilizers can apply as alternative of inorganic fertilizers for soil biomass as well as better yielding of crops. The result is also confirmed by (Dauda *et al.*, 2008).

The maximum total yield of cabbage (162.8 q/ha) followed by T2 (148.6 q/ha) meanwhile the control yielded least (121.3 q/ha). The yield parameter was statistically significant. This result is also in confirmation of Noor *et al.* 2005. The Organic manures improved the soil microbial activity; resulted better availability of soil nutrients, good air availability for root zone hence the yield increased.

Similarly, the marketable yield was also recorded highest with T1 (149.3 q/ha), followed by T2 (137.6 q/ha) meanwhile the minimum marketable yield (103.4 q/ha) was yielded by control. Due to different doses of rock phosphate and FYM; the marketable yield statistically significant. These results are in confirmation with Daset *et al.*, 2002 and kamalet *et al.* 2002.

Conclusion

The T3 (rock phosphate@375Kg+FYM@10tonnes/ha) resulted maximum in all parameters viz. - maximum plant height (31.4 cm), average weight of head (304.7 gm), total yield (162.8q/ha) and marketable yield (149.3 q/ha) respectively. Thus, it is recommended to cabbage growers of Arunachal Pradesh for application of rock phosphate @ 375 kg/ha along with FYM @ 10 tonnes/ha.

Table no.3:Result on growth & yield of cabbage influenced by different doses of Rock phosphate and manures

Treatments	Resultsofparameters (Pooled data of 2017-18)			
	Plantheight (cm)	Weightofhead (gm)	Total yield (q/ha)	Marketable yield (q/ha)
T ₁	31.4	304.7	162.8	149.3
T ₂	29.7	268.2	148.6	137.6
T ₃ (Control)	26.5	219.1	121.3	103.4
CD (5%)	1.87	22.36	14.79	9.76

T₁ – Rock phosphate@ 375 Kg/ha + FYM @ 10 Tonnes/ha,T₂- Rock phosphate@200 Kg/ha + FYM @ 10 Tonnes/ha,
T₃.Control(no use of anymanure&fertilizer)

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