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

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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-T_1 (Rock phosphate@ 375 Kg/ha + FYM @ 10 Tonnes/ha),T_2 (Rock phosphate@200Kg/ha + FYM @ 10 Tonnes/ha) and T_3 (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), totalyield(162.8q/ha)andmarketableyield(149.3 q/ha) while control yielded minimum.

Keywords: *Cabbage,Rock phosphate, FYM,*

INTRODUCTION

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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*etal.*2003;SableandBhamare,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.

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In eastern parts of Arunachal Pradesh, cabbage grows duringthe winter season.It is high in fiber & minerals, low in fat,highinfoliate,water&vitaminC.Itprocesseshighinnutritional density which protect a wider range of diseasefromcancertocataract.ItalsosuppliesPotassiumandcalciumtoo to human body. In Tirap district of Arunachal Pradesh; farmers do not use any type ofchemical fertilizers by default. This leads low productivity ofcabbage and all vegetables. Though different agencies like-dept of Agriculture/Horticulture/Krishi Vigyan Kendra hasdonealotofeffortstoeducatefarmersaboutscientificwayto application of organic and inorganic fertilizers.Besidesthat,farmerscouldnotadoptasmuchneeded.Thevegetablescropdeclineddu eto lowfertility levelofsoil.The organic mannuring can play a vital role in sustaining soilfertilityandcropproduction.Itiswellknownfactthatinorganic fertilizers are not a positive sign to crop productionsoil and human health, ecology too.The integrated nutrientmanagement is the best way to maintain the soil fertility aswellas food qualitytoo.

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Material and Methods-

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Theseverityofproblemregardingimproper/notusing of organic fertilizers was reported 40 % in the district.TookeepingallthesefactS,theKrishiVigyanKendra-Tirap,Deomali-ArunachalPradeshconductedOnFarmTrials(OFT)inRabiseason of 2017-18. And 2018-19. Respectively.TheOFTconductedin five location (0.10 ha) in five selected villages namely -Lekhi village,NutanBasti,Noitong, Mopayaandmakat.Alltheselectedfarmerswereeducatedthroughtraining program. The soil of the district is silt clay loam typehaving pH 5.8 (based on soil testing result in KVK Tirap).Theplotsizeofevery selectedfarmerwas0.02ha.Thefieldswere weedfree, wellploughed &levelled.

The Randomized Block Design with three (03) treatments and three (03) replications were applied. The first Treatment details are as follows- T_1 (Rock phosphate@ 375 Kg/ha + FYM @ 10 Tonnes/ha),T_2(Rock phosphate@200Kg/ha + FYM @ 10 Tonnes/ha) and T_3 (Control-no use of any manure &fertilizer).Rockphosphateinpowderedform @375Kg/hawasapplieduringlastploughing.Golden Acre variety was growing at Nursery of Krishi Vigyan Kendra- Tirap during second week ofOctober,2017.The25daysoldseedlingsweredistributedtoeveryselectedfarmerandtransplant ed@ 45 cm x 30 cm spacing, during the 1st week of November, 2017 and 2018 respectively. All the scientific package andpracticeswereappliedduringthe 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_2O_5(ppm)	12

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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 ^{0}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-

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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 Das*et al.*, 2002 and kamal*et al.* 2002.

Conclusion

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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), totalyield(162.8q/ha)andmarketableyield(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

T_1 – Rock phosphate@ 375 Kg/ha + FYM @ 10 Tonnes/ha,T_2- Rock phosphate@200 Kg/ha + FYM @ 10 Tonnes/ha,
T_3.Control(no use ofanymanure&fertilizer)

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Comment [Rg11]: this table is supposed to put in result and discussion section not in conclusion . please remove it from here.

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