ResearchPaper

EffectandResponseofDifferentOrganicSourcesandBio-fertilizeronSoilFertility, GrowthandYieldofCauliflowerinUttarPradesh, India.

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Abstract:

AninvestigationwascarriedoutatUttarPradesh, India, during, 2017-18 toevaluatetheefficacyoforganics (vermicompostandFarmyardmanure) withorwithoutHydroNPKonthesoilfertility, growthandyieldofcauliflower. Theexperimentconsistedof 10 treatmentsi.e.,T-1(HydroNPK), T-2 (Vermicompost@ 2tha-1), T-3 (FYM@ 2tha-1), T-4 (HydroNPK + VC@1tha-1), T-5 (HydroNPK + VC@ 2tha-1), T-6 (HydroNPK + VC@ 3tha-1), T-7 (HydroNPK + FYM@ 1tha-1),T-8 (HydroNPK + FYM@ 2tha-1) T-9 (HydroNPK + FYM@ 3tha-1) T-10 (control). VermicompostandFYMwereapplied@ 1,2 and 3t/ha-1 withorwithoutHydroNPK@1 liter ha-1 inRandomizedBlockDesignwiththreereplicationsusingcauliflowerastestcrop. Resultsrevealedthatavailablenitrogen, phosphorus, potassium (NPK) andorganiccarboncontentofthesoilafterth eharvestofcauliflowerwassignificantlyenhancedascomparedtothatofcontrol. Amongstthedifferentsourcesoforganicmatter, vermicompost@3tha-1 withHydroNPKgavehigheruptakeofNPKincomparisonwithFYMatthelevelof 3tha-1 withHydroNPK. Thehighestyieldwasrecordedintreatmentofvermicompost@3tha-1 withHydroNPKwhichwascloselyfollowedby Vermicompost@ 2tha-1 plusHydroNPK.

Keywords- *HydroNPK*, Cauliflower, Quality, Curd, Nutrientuptake

Introduction

Cauliflower (*Brassicaoleracea*var. *botrytis*L.) isoneofthemostimportantvegetablecrops belongingtothefamilyBrassicaceae. Itisbeinggrownroundtheyearforitswhitean

dtendercurd. ItiswidelycultivatedalloverIndiaforitsspecialnutritivevalues, highproductivityandwideradaptabilityunderdifferentecologicalconditions. CauliflowerisagoodsourceofvitaminAandC. Italsocontainsmineralslikepotassium, sodium, calcium, iron, phosphorus, magnesium. Cauliflowerbeingaheavyfeederandexhaustivecroprespondsverywelltonutrientsapplication. Amongvariousfactorsresponsibleforlowproductionofcauliflowernutritionisofprimeimportance. Theincreasinguseofchemicalfertilizerstoincreasevegetableproductionhasbeenwidelyrecognizedbutitslongrunimpactonsoilhealth, ecologyandothernaturalresourcesaredetrimentalwhichaffectlivingorganismsincludingbeneficialsoilmicroorganismsandhumanbeing. Theescalatingpricesofchemicalfertilizersanditsdetrimentalimpactonthesoilhealth, environmentandhumanhealthurgedthefarmertoadoptalternativesourceofnutrientsforvegetableproduction. Therefore, toreducedependencyonchemicalfertilizersandconservingthenaturalresourcesinalignwithsustainablevegetableproductionarevitalissuesinpresenttimewhichisonlypossiblethroughintegratedplantnutrientsupplysystem [1]. Besidesfertilizers, thereareseveralsourcesofplantnutrientslikeorganicmanures, biofertilizersetc. Thesenutrientssourcesapartfrommanuringofsoilnutrientsalsoimproveoverallsoilproductivity [**2]**. Biofertilizershavealsoemergedpromisingcomponentsofnutrientsupplysystem. Applicationofbiofertilizerswhichisenvironmentfriendlyandlowcostinput, playssignificantroleinplantnutrition. Amongthe*HYDRONPK*, notonlyprovidesnitrogenphosphorousandpotash, butalsosynthesizesgrowthpromotinghormonessuchasIAAandGA. Thediverseagro-climaticconditions, variedsoiltypesandabundantrainfallconditionofUttar Pradesh, Indiaenablethefavourablecultivationofcauliflower. Hence, thepresentinvestigationwasconductedtostudytheeffectofOrganicandbiosourcesinsoilfertilityandqualityofcauliflowerinUttarPradesh, India.

Materials and Methods

The field experiment was conducted during 2017-2018 at Uttar Pradesh, India. The experimental site was having PH of 5.4, organic Carbon (0.81%), available nitrogen of 265.3 kg/ha, available phosphorus of 21.5kg/ha and available potash was 119kg/ha. The experiment was laid out in a randomized block design with three replications. Forty five days old healthy seedlings with uniform vigour were transplanted in October, 2017 at 60x45cm distance. The treatment consisted of T-1(*Hydro NPK*), T-2 (Vermicompost @ 2t ha-1), T-3 (FYM @ 2t ha-1), T-4 (*Hydro NPK* + VC @1t ha-1), T-5 (*Hydro NPK* + VC @2t ha-1), T-6 (*Hydro NPK* +VC @3t ha-1),T-7 (*Hydro NPK* +FYM @ 1t ha-1),T-8 (*Hydro NPK* +FYM @ 2t ha-1) T-9 (*Hydro NPK* +FYM @ 3t ha-1) T-10 (control). FYM and vermicompost were incorporated as per treatment in respective plot prior to transplanting. *Hydro NPK* was inoculated to seedling prior to transplanting as seedling dip methods @ 1Liter ha-1.. Observations on plant growth characters and yield were recorded. The soil samples were collected before and after the experimentation. The soil samples were analyzed for pH, organic carbon, available nitrogen, phosphorus and potassium as per standard procedure [3]. The statistical analysis was carried out as per procedure given by [4]

Results and Discussion

Organic manures along with biofertilizer alone or in combination were found to have significant effect as compared to control [Table-1]. Organic carbon content of the soil after the harvest of cauliflower was significantly enhanced as compared to that of control. The highest organic carbon content was recorded in the treatment of vermicompost at 3t ha-1 with *Hydro NPK* which is greater than other treatments. FYM @ 3t ha-1 with *Hydro NPK*resulted significantly higher organic carbonthan single application of

Hydro NPK, Vermicompost and FYM respectively. The increase in organic matter content maybe due to addition of organic manure with biosource, which stimulates the growth and activity of micro-organisms, and also due to better root growth. Available nitrogen contents of the soil after the harvest of cauliflower were significantly enhanced as compared to that of control. The increase was maximum in the treatment of vermicompost @ 3t ha-1 with *Hydro NPK* (1250ml ha-1). This might be ascribed to the fact that the addition of *Hydro NPK* along with organic sources which is of rich nutrient content, narrowed the C: N ratio of the organic manures and this enhanced the rate of mineralization resulting in rapid release of nutrient from the organic source.

Table-1 Effect of Vermicompost, FYM and *Hydro NPK* on post-harvest organic carbon, available nitrogen, phosphorus and potassium content of soil.

Sl. No	Treatments	Available N. (kg ha-1)	Available P. (kg ha-1)	Available K (kg ha-1)	Organic Carbon (g kg-1)
1	T-1(*Hydro NPK*)	251.97	42.34	349.96	27.5
2	T-2 (Vermicompost @ 2t ha-1)	255.19	43.84	353.64	30.29
3	T-3 (FYM @ 2t ha-1)	259.59	44.54	356.74	28.49
4	T-4 (*Hydro NPK* + VC @1t ha-1)	269.49	49.57	366.96	42.4
5	T-5 (*Hydro NPK* + VC @2t ha-1)	273.08	51.85	370.12	51.58
6	***T-6 (Hydro NPK + VC @3t ha-1)***	***274.05***	***53.8***	***376.4***	***59.9***
7	T-7 (Hydro NPK +FYM @ 1t ha-1)	265.94	46.59	362.1	37.3
8	T-8 (Hydro NPK +FYM @ 2t ha-1)	267.32	48.32	356.13	41.2
9	T-9 (Hydro NPK +FYM @ 3t ha-1)	271.69	50.62	372.86	49.4

10	T-10 (control).	**242.5**	**41.57**	**342.62**	**25.85**
	CD 0.05	**8.47**	**1.42**	**3.74**	**1.2**

Available phosphorus content of soil increased significantly due to various nutrient management practices. Application of vermicompost at 3t ha-1 with *Hydro NPK* resulted in significantly higher residual phosphorus than other treatments. Application of organic manures along with *Hydro NPK* increased the availability of phosphorus and this is attributable to reduction in fixation of water-soluble phosphorus, increased mineralization of organic phosphorus due to microbial action and enhanced mobility of phosphorus.Significant increase in the available potassium content of soil after harvest of cabbage over control was observed in various nutrient management. Available potassium content was significantly higher in soil treated with vermicompost at 3t ha-1 with *Hydro NPK* followed by FYM at 3t ha-1 with *Hydro NPK*. Greater availability of potassium in the treatments of both the organic sources (FYM and VC) with or without Hydro NPK might be due to the beneficial effect of application of organic source and biosource.

Table-2 *Effect of Vermicompost, FYM and Hydro NPK on yield and NPK contentof cauliflower.*

Sl No.	Treatments	Curd Nutrient Content (%)			Curd Yield (t ha - 1)
		N (%)	P (%)	K (%)	
1	T-1 *(Hydro NPK)*	1.48	0.45	0.57	8.73
2	T-2 (Vermicompost @ 2t ha-1)	1.55	0.51	0.61	11.25
3	T-3 (FYM @ 2t ha-1)	1.52	0.52	0.59	11.32
4	T-4 (*ydro NPK* + VC @1t ha-1)	1.58	0.53	0.87	14.73
5	T-5 (*Hydro NPK* + VC @2t ha-1)	1.56	0.52	0.88	16.15
6	T-6 (Hydro NPK + VC @3t ha-1)	1.6	0.51	0.85	18.89

7	T-7 (Hydro NPK+FYM @ 1t ha-1)	1.57	0.45	0.73	13.62
8	T-8 (Hydro NPK+FYM @ 2t ha-1)	1.55	0.46	0.81	13.83
9	T-9 (Hydro NPK +FYM @ 3t ha-1)	1.58	0.52	0.83	14.98
10	T-10 (control).	**1.43**	**0.49**	**0.54**	**6.5**
	CD 0.05	**0.11**	**0.01**	**0.02**	**1.2**

Cauliflower yield increased significantly due to various management practices over control. The maximum curd yield (18.89 t ha-1) was recorded in treatment of vermicompost @ 3t ha-1 with *Hydro NPK* which was closely followed by vermicompost @ 2t ha-1 with *Hydro NPK*. There was an overall increase in yield from treatment of vermicompost and FYM with *Hydro NPK*as compared to single application of *Hydro NPK*, Vermicompost and FYM. The increased yield in the treatment was attributed to the beneficial effect of combined use of organic manure with biosource (*Hydro NPK*), which enhanced the nutrient availability. Enhanced microbial activities in the root zone, decomposes organic manures and also fixed unavailable form of mineral nutrients into available forms in soil.

Conclusion

To conclude we can say that, out of the different practices involving different combinations application of organic sources along with the *Hydro NPK*in certain level gave the highest yield, high nutrient uptake and good residual effect which not only improved productivity but also improved the fertility status of the soil.

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***Abbreviations:**

Ethical approval: This article does not contain any studies with humanparticipants or animals performed by any of the authors.

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