Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(5): 581-583
Received: 16-07-2019
Accepted: 18-08-2019

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A study on effect of nutrient management practices on soil chemical properties in chickpea of Karnataka state

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Abstract
A field experiment was conducted at Krishi Vignana Kendra, Kalaburagi, University of Agricultural Sciences, Raichur, conducted during rabi 2015-16. To study the "Nutrient management in chickpea (*Cicer arietinum* L.) in black soil under rainfed situation with an objective to assess soil physical and chemical properties for efficient nutrient management practices. The findings convey that, lower EC was recorded in the T11. Hence it worth to note that, The decrease in soil pH might be attributed to the release of organic acids during the microbial decomposition of added organic manures and increased the enzymatic activity in soil. Further, it also stated that, the productivity of soils can be examined by physical and chemical properties of soils. Hence the study suggests that the proportion of pH, electronic conductivity and Organic carbon directly affected by microbiological processes that encourage nutrient cycling, water holding capacity, pH buffering and cation exchange capacity activities.

Keywords: Nutrient management practices, soil chemical properties, chickpea

Introduction
Organic compounds considered as an extremely significant constraint in enhancing soil productivity. It has numerous functions with respect to physical and chemical health of soils, where physical parameters help the soil to build better biological functioning in the soils. Organic compounds contribute greater proportion for soil productivity, apart from augmenting water holding capacity which provides good soil tilth which encourages good plant roots development due to good amount of aeration in the soils (Zia *et al.*, 1994) [1]. The changing and expanding economies will always have challenge of conservation of natural resources especially soil. All over the world soil is regarded as fundamental resources in view of natural resource management for long term development where the knowledge of environmental sciences is very much crucial in sustainable development (Brady, 2005) [2]. On the other end, Soil pH also plays important role in analyzing the nature of soil which helps us to determine either soils are acidic or alkaline in nature. The pH scale ranges from value 0.0 to 14.0, where 0.0 values indicates most acid, 14.0 indicates alkalinity. The value for 7.0 indicates the neutral status of soils which says that neither acid nor alkaline in nature.
Many studies revealed that the Soil characteristics are affected by drainage, nitrogen deposition, land use pattern and site preparation which alternatively will affect health and productivity of soils. Soil characteristics can be greatly affected by of chemical properties of temperate in soils and part of Himalayas which contain different types of soil, which alternatively insufficient. The agricultural soil can be beneficial for health and productivity of farm lands and also distinct accessibility in soil chemical properties due to appraisal on soil quality is important because it perennial forest crops cultivation are by reducing within the pH (Rhoades and Binkley, 1996) [3]. The pH function determines the availability other nutrient materials (Pereira, 1996) [4]; and also transform in encouraging plants and flora and fauna health (Lima, 2008) [7]. With this background information study was conducted at Krishi Vignana Kendra, Kalaburagi, University of Agricultural Sciences, Raichur, conducted during rabi 2015-16. To study the "Nutrient management in chickpea (*Cicer arietinum* L.) in black soil under rainfed situation.

Materials and methods
A field experiment was conducted at Krishi Vignana Kendra, Kalaburagi, University of Agricultural Sciences, Raichur, conducted during rabi 2015-16. To study the "Nutrient management in chickpea (*Cicer arietinum* L.) in black soil under rainfed situation". The experiment consisted of eleven treatments comprised of RDF alone, in combination of FYM, Jeevamrutha and vermicompost.

The trial was laid out in randomized complete block design (RCBD) with three replications. Further, the Chemical analysis of soil was analyzed using standard methods and procedures.

Results and Discussions

The findings of the physical and chemical analysis of soil and plant samples were subjected to appropriate methods and the observations are presented in following subheads as pH, electronic conductivity and Organic carbon content in soil.

1 Soil reaction (pH) (Table 1)

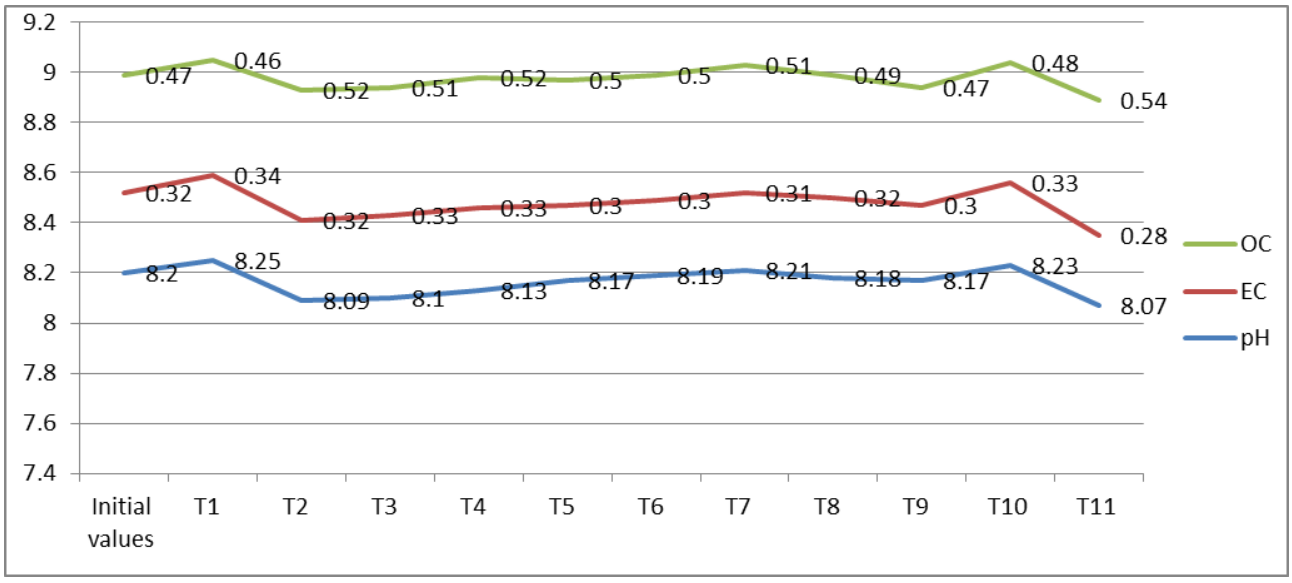
Soil reaction did not differ significantly among the treatments after harvest of chickpea. There was no significant difference in the soil pH due to application of organic sources. Soil pH has slightly decreased after harvest of chickpea crop compare to initial pH value (8.20). The decrease in soil pH might be attributed to the release of organic acids during the microbial decomposition of added organic manures and increased the enzymatic activity in soil. These results are in conformity with those reported by Babu and Reddy (2000) [5], stated that addition of vermicompost increases soil pH initially and decreases in the later stage due to release of organic acids during decomposition.

Table 1: Chemical properties of soil after harvest of the crop as influenced by nutrient management practices.

Treatment details	pH (1 : 2.5)	EC (dSm^{-1})	OC (%)
Initial values	**8.20**	**0.32**	**0.47**
T_1 : RDF(10:25:0 N:P_2O_5:K_2O kg ha^{-1})	8.25	0.34	0.46
T_2 : FYM @ 5 t ha^{-1} + 50% RDF	8.09	0.32	0.52
T_3 : FYM @ 5 t ha^{-1} + 75% RDF	8.10	0.33	0.51
T_4 : FYM @ 5 t ha^{-1} + 100% RDF	8.13	0.33	0.52
T_5 : FYM @ 5 t ha^{-1} + Jeevamrutha	8.17	0.30	0.50
T_6 : VC @ 2.5 t ha^{-1} + 50% RDF	8.19	0.30	0.50
T_7 : VC @ 2.5 t ha^{-1} + 75% RDF	8.21	0.31	0.51
T_8 : VC @ 2.5 t ha^{-1} + 100% RDF	8.18	0.32	0.49
T_9 : VC @ 2.5 t ha^{-1} + Jeevamrutha	8.17	0.30	0.47
T_{10} : RDF + Jeevamrutha	8.23	0.33	0.48
T_{11} : FYM @ 5 t ha^{-1} + VC @ 2.5 t ha^{-1} + Jeevamrutha	8.07	0.28	0.54
S.Em ±	0.21	0.01	0.02
CD (0.05)	NS	NS	NS

RDF: Recommended Dose of Fertilizer, **FYM:** Farm Yard Manure, **VC:** Vermicompost. **NS:** Non Significant

The graph.1 reveals that, the initial values of soil reaction (pH), Electric conductivity of soil and Organic carbon content of soil parameters conveys that only in case of Treatment (T2) and Treatment (T10) it was less and more than initial vales respectively.



Graph 1: Chemical properties of soil after harvest of the crop as influenced by nutrient management practices

2 Electric conductivity of soil (Table 1)

Data pertaining to EC did not show significant difference due to integrated nutrient management practices. The findings revealed that, lower EC was recorded in the (T_{11}) FYM @ 5 t ha^{-1} + VC @ 2.5 t ha^{-1} + Jeevamrutha and the highest EC was recorded with application of T_1 (RDF alone). EC of soil did not vary much due to incorporation of different organic manures and the results are in conformity with the findings of Amjad Ali *et al.* (2011) [6].

3 Organic carbon content of soil (Table 1)

The organic carbon content of soil not differs significantly due to application of organic manures application. The findings revealed that, higher organic carbon content was recorded in the treatment (T_{11}) FYM @ 5 t ha^{-1} + VC @ 2.5t ha^{-1} + Jeevamrutha. However, least organic carbon content was recorded in the T_1 (RDF + FYM). This might be due to build-up of higher amount of organic carbon in soil after harvest of crop which is due to addition of higher biomass to

soil through vermicompost, farm yard manure and jeevamrutha. Similar results were obtained by Amjad Ali *et al.* (2011) [6].

Conclusions

The findings reveals that, Soil chemical properties *viz*., pH, EC, OC did not differ significantly, whereas available major and micro nutrients in soil after harvest of chickpea was significantly higher in FYM @ 5 t ha^{-1} + VC @ 2.5 t ha^{-1} + Jeevamrutha followed by VC @ 2.5 t ha^{-1} + 100% RDF, VC @ 2.5 t ha^{-1} + Jeevamrutha and FYM @ 5 t ha^{-1} + Jeevamrutha. Significantly lower values of major and micro nutrients were noticed with RDF treatment.

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