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Research Article

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The Influence of Nanobiomic and Intercropping Cow Pea and Sour Tea on some Characteristics of Cow Pea

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Abstract Biological manures term refers to fertile materials that involve one or more beneficial soil organism within a suitable preservative. In fact, this manure includes different types of microorganisms. In order to study the influence of nanobiomic manure on characteristics in intercropping of hibiscus with cowpea, an experiment has been conducted as split plot in a randomized complete block design with three replications at the Research Farm of Agriculture Center of Zabol University in Zahak during the growing season of 2015-2016. The factors studied in this study include bio-fertilization of nanobiomic as the main plot in two levels of use and non-use of bio fertilizer and different levels of intercropping in five levels: sole sour tea, sole cowpea, 50% sour tea + 50% cowpea, 75% sour tea + 25% cowpea and 25% sour tea + 75% cowpea were as sub plot. Composite soil sampling was made in the experimental area before the imposition of treatments and was analyzed for physical and chemical characteristics. Analysis of variance showed that the effect of nanobiomic and intercropping on leaf nitrogen non significant and significant respectively. Effect of nanobiomic and intercropping on grain nitrogen and grain protein was significant.

Keywords Leaf nitrogen,Grain nitrogen, Grain protein

Introduction

Biological fertilizers have special significance in increasing crop production and reserve soil sustainable fertility [1]. Due to the higher cost and hazardous effect of chemical fertilizers, application of biofertilizers has gained momentum in the recent years to enhance plant growth and yield [2]. The term of biological fertilizer is not particularly for organic matters from manure, crop residue, green manure, etc., but also includes bacterial and fungus micro organisms, specially PGPR sand compounds from their activity [3]. Overall, biological fertilizers term refers to fertile materials that involve one or more beneficial soil organism within a suitable preservative. In fact, this fertilizers include different types of microorganisms [4-5], that could converse nutrients from unavailable form to available form during a biological process [6], and resulted in develop root system and increase seed germination rate [4]. Enhanced productivity of multispecies agro ecosystems (intercropping) compared with that of monospecific agro ecosystems (each of the component species being grown alone) may be explained by two major processes that result in improved resource use: complementarity and facilitation. Species may use a given resource differently in time, in space, and in forms [7]. Intercropping has significant effects on microbiological and chemical properties in the rhizosphere, which may contribute to the yield enhancement by intercropping. Another explanation is that P efficient species may increase P mobilization in the rhizosphere by acidification. This may then increase P availability for less P efficient crops [8]. *H. sabdariffa* belongs to Malvaceae family and is successfully grown in tropical and subtropical climates [9]. The calyx is a commercially important part of the *H. sabdariffa* commonly used in making jam, juice, jelly, gelatine, syrup, wine, ice cream, pudding, cake and flavouring. The calyx is also rich in secondary metabolites, which

have medicinal properties [10]. Cowpea (*Vigna unguiculate*) is a legume grown in savannah region, the tropics and sub-tropics. It is largely grown in the West and Central African countries. Its value lies with its high protein content. Its ability to tolerate drought and poor soil makes it an important crop in the savannah region where these constraints restrict other crops. Cowpea seed is nutritious and is a cheap source of protein for both rural and urban consumers. The seed contains about 25%protein and 64% carbohydrate [11].

Material and Methods

Location of Experiment

The experiment was conducted at the Research Farm of Agriculture Center of Zabol University in Zahak during the growing season of 2015-2016.

Composite Soil Sampling

Composite soil sampling was made in the experimental area before the imposition of treatments and was analyzed for physical and chemical characteristics.

Field Experiment

The field experiment has been conducted as split plot in a randomized complete block design with three replications

Treatments

The factors studied in this study include bio-fertilization of nanobiomic as the main plot in two levels of use and non-use of bio fertilizer and different levels of intercropping in five levels: sole sour tea, sole cowpea, 50% sour tea + 50% cowpea, 75% sour tea + 25% cowpea and 25% sour tea + 75% cowpea were as sub plot.

Data Collect

Tables and charts are done using Word and Excel. Comparison of mean treatments using Duncan's multiple range test was investigated at 5% level.

Results and Discussion

Leaf Nitrogen

Analysis of variance showed that the effect of nanobiomic and intercropping on leaf nitrogen non significant and significant respectively (Table 1). The maximum of leaf nitrogen of treatments Nanobiomic application + 50% sour tea + 50% cowpea (0.8508 ppm) was obtained (Table 2).The minimum of leaf nitrogen of treatments Nanobiomic application + 75% sour tea + 25% cowpea (0.6731 ppm) was obtained (Table 2). Enhanced productivity of multispecies agro ecosystems (intercropping) compared with that of monospecific agro ecosystems (each of the component species being grown alone) may be explained by two major processes that result in improved resource use: complementarity and facilitation. Species may use a given resource differently in time, in space, and in forms [7].

Table 1: ANOVA analysis of the cowpea affected by nanobiomic manure and intercropping

		MS		
Sov		**Leaf nitrogen**	**Grain nitrogen**	**Grain protein**
R	2	0.0001ns	0.0095ns	0.178ns
Nanobiomic	1	0.0023ns	0.3128**	12.21**
Error a	2	0.0003	0.0069	0.097
Intercropping	3	0.0226**	0.2730**	10.66**
Nanobiomic*Intercropping	3	0.0053**	0.2858**	11.16**
Error b	12	0.00058	0.0074	0.113
CV	-	3.26	9.16	5.70

*, **, ns: significant at $p<0.05$ and $p<0.01$ and non-significant, respectively.

Grain Nitrogen

Analysis of variance showed that the effect of nanobiomic and intercropping on grain nitrogen was significant (Table 1). The maximum of grain nitrogen of treatments No nanobiomic + Pure phosphor (1.7017 ppm) was obtained (Table 2). The minimum of grain nitrogen of treatments Nanobiomic application + 50% sour tea + 50%

cowpea (0.8101 ppm) was obtained (Table 2). Intercropping has significant effects on microbiological and chemical properties in the rhizosphere, which may contribute to the yield enhancement by intercropping, Another explanation is that P efficient species may increase P mobilization in the rhizosphere by acidification. This may then increase P availability for less P efficient crops [8].

Grain Protein

Analysis of variance showed that the effect of nanobiomic and intercropping on grain protein was significant (Table 1). The maximum of grain protein of treatments No nanobiomic + Pure phosphor (10.636mg/l) was obtained (Table 2). The minimum of grain protein of treatments Nanobiomic application + 50% sour tea + 50% cowpea (5.063mg/l) was obtained (Table 2). Ryan *et al.* [12] worked on organic fertilizers in crops and reported that organic manures significantly affected plant height, leaf area and fruit number plant. Abd El-Rahman and Hosny [13] stated that using organic manure improved the yield and yield components of egg-plant fruits.

Table 2: Comparison of different traits affected by affected by nanobiomic manure and intercropping

Treatment	Leaf nitrogen (ppm)	Grain nitrogen (ppm)	Grain protein (mg/l)
No nanobiomic + Pure phosphor	0.7124c	1.7017a	10.636a
No nanobiomic + 50% sour tea + 50% cowpea	0.7938b	0.8101b	5.063b
No nanobiomic + 75% sour tea + 25% cowpea	0.6975c	0.9078b	5.674b
No nanobiomic + 25% sour tea + 75% cowpea	0.7898b	0.8156b	5.097b
Nanobiomic application + Pure phosphor	0.6894c	0.8196b	5.123b
Nanobiomic application + 50% sour tea + 50% cowpea	0.8508a	0.8101b	5.063b
Nanobiomic application + 75% sour tea + 25% cowpea	0.6731c	0.8644b	5.402b
Nanobiomic application + 25% sour tea + 75% cowpea	0.7016c	0.8278b	5.173b

Any two means not sharing a common letter differ significantly from each other at 5% probability

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