



**EFFECTS OF OPTIMUM MANAGEMENT OF CHEMICAL AND BIOLOGICAL
FERTILIZER SYSTEMS ON YIELD AND YIELD COMPONENTS OF TWO BEAN
SPECIES**

SIROUS MASOUDI¹ AND SEYED MASHAALLAH HOSSEINI²

1: M.A student of agronomy, Department of agronomy, Arsanjan Branch, Islamic Azad University,
Arsanjan, Iran

2: Assistant professor Department of agronomy, Arsanjan Branch, Islamic Azad University,
Arsanjan, Iran

***Corresponding Author: Sirous Masoudi**

ABSTRACT

In order to investigate the effect of optimum management of chemical and biological fertilizer on yield and yield components of two bean species, a factorial experiment was conducted based on randomized complete block design with three replications in 2014. The treatments were included four fertilizer levels as follows: no application of N, application of 60 kg N, application of 30 kg N + 3 l/ha Nitroxin, application of 30 kg N + 25 t animal manure and two species of bean (kidney bean and Pinto bean). The studied traits were included plant height, number of pod per plant, number of seed per pod, 100 seeds weight, seed and biological yield and harvest index. The results showed that the highest amount of plant height, number of pod per plant, number of seed per pod, 100 seeds weight, seed and biological yield was belonged to 30 kg N + 25 ton animal manure treatment and between species was belonged to kidney bean. The results of interaction of the treatments showed that the highest amount of plant height, number of pod per plant, number of seed per pod, 100 seeds weight, seed and biological yield obtained by application of 30 kg N + 25 ton animal manure and in kidney bean and the lowest amount of them were belonged to no application of N treatment and in pinto bean. In general the results of this experiment showed that in order to achieving the aims of sustainable agriculture, reduction in application of chemical N fertilizer to half and replacing that with animal manure not only compensated the effectiveness of the N fertilizer on growth and yield of bean but also increased them significantly. It seems that significant

increase of yield and yield components in chemical fertilizer + animal manure treatment, is connect with positive effects and physical and chemical properties of animal manure that in addition of providing essential elements for plants can influence the growth of them. Thus, it can be concluded that the combined application of animal manure and chemical fertilizers moreover of improving crop growth and yield, will help to preserve the environment.

Key words: Bean, nitrogen efficiency, animal manure, yield, growth improvement, healthy environment

INTRODUCTION

Pulses with a 17 to 35 percent protein can have a major role in the human diet. After the cereal grains are the most important food in the diet of Asian and African countries located directly beside the food and the people of other countries are attending (Sayyadi, *et al*, 2010). The need to improve the quality and safety of agricultural products in different sectors with increased production efficiency to encourage the use of organic materials such as crop residues and manure to reduce the use of chemical fertilizers for sustainable agricultural system is (Tarangv Riverto *et al.*, 2009). The use of renewable resources and inputs, one of the principles of sustainable agriculture that will maximize agricultural productivity and environmental risks are minimal (Kyzylkaya, 2008). Increase performance and reduce risks, requires the use of modern solutions of the crops that can be pointed to biofertilizers (Hegdeh *et al.*, 1999). Soil microorganisms, particularly bacteria can be done by various biological processes in all stages of change on nutrient cycling in the soil thoroughly involved

and thus affect plant growth. Absorbent soil microorganisms and plant root exudates to refer them to the root the rhizosphere is the root environment, mutual beneficial relationships between plants and some microorganisms can be established. The use of plant growth promoting bacteria which are briefly called PGPR has a long history of more than a century to mature (Olamai and Arzanesh, 2001). Stimulation and increased plant growth, nitrogen fixation by PGPR in various ways, such as air molecules, the production and secretion of growth regulators such as auxin, gibberellin and cytokinin production vitamins to help release of phosphorus, potassium, nitrogen and micronutrients soil and done in other ways (Nasiri *et al.*, 2004; Alikhany and Saleh Rastin, 2001). Nitrogen is one of the most important elements for plant growth. Nitrogen supply through the use of chemical fertilizers is one of the main causes of pollution of the water cycle in nature. Moreover their production is costly, while replacing them with organic fertilizers plays an important role. Improve soil quality can be evaluated based on

improvements in the quality and quantity of life. Therefore, the use of best management practices for the conservation of biological fertilizers, soil quality is considered desirable (Mohammadian Roshan *et al.*, 2010). Especially compared to chemical fertilizers, organic fertilizers and animal manure contains large amounts of organic matter and can be a rich source of nutrients, particularly nitrogen, phosphorus and potassium are considered (Fernandez *et al.*, 1993). And to review the elements at their disposal plants (Ighbal *et al.*, 2004), but not all the nutritional requirements of plants to be resolved manure (Malanagvda, 1995), with the improvement of the physical structure of the soil to the extent caused by equilibrium in the the chemical soil will (Chaavdhary *et al.*, 1999). On the other hand, chemical fertilizers by providing immediate food needs of plants, causing a dramatic increase in growth and are (Malanagoda, 1995), The indiscriminate use of chemical fertilizers in the world today, spread followed by health and environmental hazards are created. The use of manure and chemical conditions of any kind can affect yield (Marshner, 1995). Results Eydizadeh *et al* (2010) have shown that the application of biofertilizers can reduce the use of chemical fertilizers, produced a good performance and, therefore, not only increase the income of farmers, but also in reducing the negative consequences of the use of chemical fertilizers. Their results also showed that the

biological fertilizers alone cannot replace chemical fertilizers, but they can be used as a supplement in addition to chemical fertilizers (Eydizadeh *et al.*, 2010). So with regard to the items listed in this experiment to determine the effect of biofertilizers on growth and yield of bean varieties and fertilizer nitrogen use efficiency were studied.

MATERIALS AND METHODS

The Agricultural Experiment Station, 2013-2014 and Aspas village 55 km South West of city Eghlid implemented. Location Test in latitude 30 degrees 37 minutes and longitude 52 degrees 25 minutes is located. A factorial experiment in a randomized complete block design with three replications. Treatments consisted of two species of bean (S1) and pinto beans (S2) and various compounds containing non-application of fertilizer (control) (F1), Application of 60 kg N from urea (F2), consumption of 30 kg N ha of urea + 3 liters of bio Nitroxin (F3) and 30 kg N Fertilizer Of urea + 25 ha sheep manure (F4), respectively. After land preparation, experimental units consisted of 8 rows by 4 meters wide and 3 meters long established and 50 cm between rows and 10 cm row spacing was considered. The optimum amount of fertilizer P and K soil test based on consumption. Use a split application of nitrogen treatments during the growing season In this case, the amount of fertilizer was divided into three parts, the first part of the plant, the second part of the

phenological stage V3 (with Brgchhay single leaf node, three nodes on the main stem has been completed) and the third part of the phenological stages of flowering R1 (see a goal in each of the main stem nodes) to encode Feher and colleagues (1971) were performed. Nitroxin consumption to grow by installments over the course of this case was that the 1/5 liter in the V3 And 1/5 liters of water-soluble liquid phase and the R1 was applied. Manure before planting in the experimental units were distributed by the Bill and then returned to the soil And then the row was created. At maturity, plant height, number of pods per plant, number of seeds per pod, seed weight, biological yield and harvest index were evaluated. Statistical analysis of the data obtained in this experiment was performed using SAS software version 1.9 and compared by Dancan test was performed.

RESULTS AND DISCUSSION

Effect of fertilizer on yield, and plant systems

The results of analysis of variance showed a significant effect of treatments and plant species at one of the traits In this experiment, plant height, number of pods per plant, number of seeds per pod, seed weight, seed yield, biological yield and harvest index were found. In addition, the interaction between treatments on all traits were significant at one percent (**Table 1**).

Treatments consisted of two species of bean (S1) and pinto beans (S2) and a four-level

systems include lack of N fertilizer (control) (F1), application of 60 kg N fertilizer from source urea (F2), 30 kg N ha of urea + 3 liters of bio Nitroxin (F3) and 30 kg N ha of urea + 25 sheep manure (F4), respectively. The number of pods per plant

A simple comparison of the number and species of bean pods affected by the treatments showed that the highest number of pods per plant

Beans on the comparison of means and forms of interaction of treatments on bean pods per plant showed the highest number of pods per plant, average 42/44 Sheath of Urea 30 kg urea fertilizer treated with 25 tons of manure application and the bean and the lowest average of 24/47 sheath was treated no application for Pinto bean

Number of seeds per pod:

A simple comparison of seeds per pod bean varieties and fertilizer treatments showed that the highest number of seeds per pod of 30 kg fertilizer treatments.

25 tons of manure and urea in combination with the highest number of seeds per pod bean varieties of red beans.

Seed weight

Comparison of effect of seed weight and species of bean fertilizer treatments showed that the highest seed weight of 30 kg of urea fertilizer treatments With consumption of 25 tons of manure and among species of beans and red beans had the highest grain yield.

Index Withdrawals:
 Comparison of the mean effect of fertilizers on harvest index (HI) showed that the application of 60 kg urea was treated with 30 kg of fertilizer treatments With consumption of 25 tons of manure and 30 kg of urea in

combination with 3 liters of bio-fertilizer were in a group nitroxin And the lowest harvest index of lack of fertilizer treatments was between two kinds of beans, pinto beans of the highest harvest index.

Table 1: Analysis of variance components and functionality of plant species

Index Removal	Operation Biological	Operation Seed	Weight Seed	Grains The Pod	Pods Plant	Height Bush	Degree Freedom	Resources
^{ns} 7/12	20282/04**	131260/31**	308/18**	90/21**	197/28**	^{ns} 10/19	2	Changes
60/33**	27467/25**	12933/25**	266/45**	169/10**	224/45**	96/24**	3	Block
46/03**	44477/20**	16935/24**	402/12**	136/18**	199/20**	76/04**	1	Cody systems
70/67**	21236/70**	14831/63**	313/07**	187/37**	276/32**	85/64**	3	Bean
65/24	1368/37	4706/01	20/63	5/87	11/11	10/02	14	Interaction
11/60	12/32	10/15	10/36	12/32	13/02	9/68	-	CV%

Ns and ** respectively, no significant differences were significant at one percent

Table 2: Comparison of interactions affect yield and yield components of such systems and Cody Beans

Index Removal	Operation Biological	Operation Seed	Weight Seed	Grains The Pod	Pods Plant	Height Bush	Fertilizer System × types of beans
31/59d	9215/56f	3137/25f	46/33d	2/57d	30f	33/68f	S1×F1
38/31b	12796/32 b	4886/25b	56/06a	3/48b	39/09b	50/38b	S1×F2
38/27b	11735/25c	4458/63d	48/85c	3/05c	36/9c	47/25c	S1×F3
37/61b	13610/29a	5117/25a	55/36a	3/98a	42/44a	53/2a	S1×F4
33/28c	7517/25g	2689/33g	41/19f	1/6g	24/47g	28/43g	S2×F1
40a	11097/33d	4438/21d	50/93b	2/51d	33/54d	42e	S2×F2
39/96a	10036/54e	4010/25e	43/71e	2/08e	31/36e	45/13d	S2×F3
39/3a	11911/25c	4669/65c	50/25b	3/01c	36/91c	47/96c	S2×F4

Joint letters; no significant difference at 5% probability level by Duncan

CONCLUSION

The results showed that the treatments had a significant effect on the probability of one percent of the plant species and traits In this experiment, plant height, number of pods per plant, number of seeds per pod, seed weight, seed yield, biological yield and harvest index were found. In addition, the interaction between treatments on all traits were significant at one percent. Comparison of the mean interaction treatments showed the highest yield and its components to the application of 30 kg urea treatment With consumption of 25 tons of manure for treatment of non-application of the

bean and the lowest was for Pinto bean. Since one of the main goals of this experiment is to investigate the possibility Reduced nitrogen fertilizer use and replace it with organic fertilizers and biological in achieving the goals of sustainable agriculture, the results showed that Reduction of nitrogen in half and replace it with the use of manure not only the effect of fertilizer on plant growth and yield but also significantly increased to compensate for them. It seems that the significant increase in yield and its components in the positive effects of manure and chemical fertilizer as well as the chemical and physical properties In addition to

providing nutrients for plant and animal manure is associated. Thus it can be concluded that the combined application of manure and chemical fertilizers to improve crop growth and yield, will help to protect the environment.

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