Evaluation of integrated fertilizers management on growth and seed production of bottle gourd (*Lagenaria siceraria L.*) under Sohag governorate condition

ABSTRACT

This field experiment was carried out at Shandweel Research Station, Sohag Governorate, Agricultural Research Center, Egypt, during the two summer seasons of 2020 and 2021 to evaluate the influence of Integrated Nutrient Management (INM) application of organic, inorganic and bio- fertilizer on vegetative growth, flowering, fruit yield, dry seed yield and its components as well as seed quality of bottle gourd. All studied treatments were arranged in a randomized complete block design with three replicates. The results mentioned that the combinations of adding [75% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] was the best treatment and gave the highest values of vegetative growth and flowering, fruit yield, dry seed yield and its components as well as seed quality and followed by adding [50% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed]. However, the lowest mean values of vegetative growth and flowering, fruit yield, dry seed yield and its components as well as seed quality were obtained by adding (*Azospirllum*/fed).

Keywords: Bottle gourd, NPK, FYM, biofertilizers (*Azospirllum*), growth, flowering, fruit yield, dry seed yield, seed quality.

Introduction

Bottle gourd (*Lagenaria siceraria*) is a cucurbitaceous vegetable crop grown for its green soft fruits, which are consumed in a number of ways as a vegetable. Vitamins, calcium, potassium, and other nutrients are abundant in this fruit. It is grown for its edible fruit in a variety of tropical and subtropical nations. Bottle gourd fruits that are still immature and sensitive are eaten raw or used to make pickles and other goods. The therapeutic properties of bottle gourd are numerous (**Harika *et al.*, 2012**). It can be grown both in the summer and in the rainy season (**Yadav *et al.*, 2010**). Fruit is utilized as vegetables, desserts, raita, and pickles when it is still green or delicate. The young fruits are typically served as a vegetable. Fruits that have reached maturity have firm shells. “The hard shells of mature fruits are used as containers, hats, decorative handy-crafts and flatus

musical instruments. Numerous health benefits are reported in bottle gourd including its anti-cancerous, cardio protective" **(Fard *et al.*, 2008)**. It has a cooling effect and prevents constipation and has diuretic and cardio-tonic properties.

Fertilizer is an important agricultural ingredient for increasing crop yields. Foliar nutrition is acknowledged as a significant technique of fertilization and a speedier form of absorption, because foliar nutrients usually penetrate the leaf cuticle or stomata and enter the cells, allowing for easy and rapid nutrient usage. The leaves absorb the majority of the plant's nutrients, and absorption is quick and practically complete. Furthermore, foliar feeding would be more beneficial in early maturing crops and might be used in conjunction with routine plant protection strategies. "When foliar nutrition is used, it lowers the cost of cultivation, which in turn lowers the amount of fertilizer used, lowering crop production expenses. Supplemental foliar fertilization during crop development can boost yields. Supplementary foliar fertilization during crop growth can improve the mineral status of plants and increase the crop yield", **(Elayaraja and Angayarkanni; 2005 and Rajesh and Paulpandi, 2013)**.

The amount of organic matter in the soil is increased by using organic manures. They provide organic acids, which aid in the dissolution of soil nutrients and their availability to plants. Organic manure application improves soil fertility, structure, and moisture holding capacity. Using bovine dung as an organic fertiliser may assist to reduce soil erosion, reduce harm from saline and sodium problems, which are increasing in sandy soil as a result of an excessive residual of chemical fertilisation, and improve subsurface water quality. The usage of alternatives to cow manure can give an environmentally friendly way of disposing of waste items (**Allahyari *et al.*, 2008**). Organic matter expands the pore space in the soil, allowing water to be held more easily and allowing the soil to hold more water in the soil and make nutrients more accessible to the plant **(Lal, 2008)**.

"Furthermore, the application of solid cattle manure, moves soil pH towards neutrality. The pH also, plays an important role in the solubility of nutrients in the soil, thus improving nutrient availability, especially for P and micronutrients, favorable for plant growth and beneficial microbial processes" **(Benke *et al.*, 2008)**. "Organic fertilization is an important role to produce higher number of

pods/ plant, number of grains per pod, thousand grain weights and seed yield of bean plants as mentioned by **Lunazendejas *et al.* (2011)**. **Bakayoko *et al*. (2013)** elucidate that adding the cattle manure at the rate of 10 (ton/ ha.) significantly increased soil organic matter, improving the structural stability and increasing the water retention of the sandy soil". **Chaudhury (2014)** verified that soil organic matter helps to maintain good aggregation and increase water holding capacity and exchangeable K, Ca and Mg. It also reduces P fixation, leaching of nutrients and decreases toxicities of Al and Mn.

"Concerning the essential ingredient of nitrogen, the chlorophyll component promotes vegetative development and leaf colouring. It also plays a role in photosynthesis, is a component of vitamins, and aids in the creation and use of carbohydrates, as well as influencing energy responses in plants" (**Sara *et al.*, 2013**). Amino acids, which are the building blocks of proteins, are formed when nitrogen is physiologically coupled with C, H, O, and S. Amino acids are necessary for the formation of protoplasm, which serves as a location for cell division and, as a result, plant growth and development. All plant enzymes are formed up of proteins; hence nitrogen is required for all enzymatic reactions. Because nitrogen makes up a large component of the chlorophyll molecule, it is important for photosynthesis. "Nitrogen is a necessary component of several vitamins and improves the quality and quantity of dry matter in leafy vegetables and protein in grain crops" (**Silva and Uchida, 2000)**.

Phosphorus is required for plant physiological functions such as photosynthesis, energy transfer within the plant, and carbohydrate synthesis and breakdown. Phosphorus is also vital for sugar production and aids to the formation of essential minerals for growth. "Spraying phosphorus compounds on plant roots can alter growth and sucrose percentage in the roots, but the concentration and timing of the spray are crucial (**John and Jim, 1980 and California Fertilizer Foundation, 2009**). **Fabrcio *et al.*, (2012**) found that foliar phosphorus application enhanced root dry weight, shoot dry weight, root to shoot ratio, and chemical compound concentrations of N, K, Mg, B, Cu, Mn, and Fe in shoot tissues". "According to **Mauro *et al.*, (2005)**, mentioned that foliar application with phosphorus increased sugar beet photosynthesis (chlorophyll a, b and carotenoid)".

"Moreover, **Fageria *et al.*, (2009)** pointed out that foliar application with phosphorus increased phytohormones and amino acids content".

Biofertilizer application depends on inoculating seeds, soil and plant roots with free living or symbiotic microorganisms in order to increase these microorganisms in root zone. *Azospirillum* sp, Rhizobium sp and *Azotobacter* sp are used for the activation of N-fixation through symbiotic or free living bacteria.

So, the trial was laid out to find out the integrated effect of chemical fertilizers in combination with organic manures and bio-fertilizer to achieve the maximum economic return on growth, flowering, fruit yield, dry seed yield and its components as well as the quality of bottle gourd.

MATERIALS AND METHODS

This investigation was carried out at Shandweel Research Station, Sohag Governorate, Agricultural Research Center, Egypt, during the two growing successive summer seasons of 2020 and 2021 to study the influence of Integrated Nutrient Management (INM) application of organic, inorganic and bio- fertilizer on vegetative growth and flowering, fruit yield, dry seed yield and its components as well as the quality of bottle gourd**.** Soil samples were randomly collected each year before cultivation at a depth of 0-30 cm in order to measure the important of the physical and chemical properties which determined according to **(Jackson, 1973)** were shown in Table (1).

Table (1): Soil physical and chemical analysis.

	Seasons	2020	2021
physical properties	**Soil texture**	Clay loam	Clay loam
	Clay %	35.54 %	29.86%
	Coarse sand %	1.46 %	1.14 %
	Fine sand %	21 %	37 %
	Silt %	42 %	32%
	Organic Matter %	-	-

	Total N%	0.146	0.220
	$CaCo_3$ %	1.4	1.5
Chemical properties	**Soluble ions (meq/100g soil (1:5)**		
	Co_3-	---	---
	HCo_3-	0.26	0.33
	Cl^-	0.79	0.90
	So_4-	1.00	1.15
	Ca^{++}	0.50	0.55
	Mg^{++}	0.24	0.34
	Na^{++}	1.17	1.33
	K^+	0.14	0.16
	EC,dS/m	0.21	0.24
	pH	7.3	7.2

The experimental design was arranged in a randomized block design with three replications consisted of eleven treatments combinations as follows:-

1. RDF 70.45.48(NPK)/fed. (cont.)
2. *Azospirllum*/fed.
3. FYM20m^3/fed.
4. 75 % RDF (NPK) + *Azospirllum*/fed.
5. 50 % RDF (NPK) + *Azospirllum*/fed.
6. 75 % RDF (NPK) + FYM20m^3/fed.
7. 50 % RDF (NPK) + FYM20m^3/fed.
8. 75 % RDF (NPK.) + *Azospirllum* +10m^3 FYM/fed.
9. 50 % RDF (NPK) + *Azospirllum* +10m^3 FYM/fed.
10. *Azospirllum*. + FYM 20m^3/fed.
11- 100 % RDF (NPK.) + FYM 20m^3/fed**.**

All treatments were laid out in a randomized complete block design. The plot area was 11.2 m^2 and included 4 ridges, each ridge of 0.7cm width and 4m length. Seeds of bottle gourd were sown in the 1st week of April in both seasons in hills on one side of ridges at 25 cm apart. The 1st two ridges were used for fruits and the other ridges were deposed for dry seed yield and its components. Bottle gourd seeds were witted with a sticky solution (30 g of Arabic gum/ L of tap water and then seeds were inoculated with bio-fertilizers carrying bacteria as Rhizobacterin which contains *Azospirllum*. One package /fed were used of

contained 300g/fed. The other agricultural practices were conducted as the recommendation of the Egyptian Ministry of Agriculture.

Data were recorded on plot basis and included plant growth characteristics, dry seed yield and its components as well as chemical composition of dry seeds which were described under experimental procedures.

Data Recorded:

1-Vegetative growth characteristics:

A sample of five plants were taken randomly from each plot at the flowering stage (after 55 days from sowing) in order to determine vegetative growth characteristics i.e. vine height(cm), number of leaves, leaf height (cm), Leaf depth(cm) and number of branches per plant as well as shoot length.

2- Flowering parameters:

At flowering stage, A sample of three plants were taken randomly from each plot to determine flowering parameters; days taken of anthsis of female flower, days taken of anthsis of male flower, number of female flower/vine, number of male flower/vine.

3- Fresh fruit yield characters:

A sample of five bottle gourd fruits at edible stage was randomly taken from each plot at the second picking to determine the following data: No. of fruits /plant, fruit length (cm), fruit width (cm).

4-**Dry seed yield and its components:**

At the harvest stage, samples of five random plants from each plot were lifted till full fruits maturity to record the following characters: dry seed wt./ fruit(g), seed index (100 dry seeds weight (g), dry seed yield/plant(g). Moreover, total dry

seed yield per plot were evaluated as (kg/plot) and then total dry seed yield (kg/fed) was calculated through dry seed yield/plot.

5-Seed germination tests:

Dry seeds from bottle gourd were treated with Tobsen fungicide then put it in filter paper inside germination incubator at 25 C^{o} and the germination tests were calculated i.e. Germination % and Germination rate as follows:

$$\text{Germination \%} = \frac{\text{No. of germinated seeds}}{\text{No. of sown seeds}} \times 100$$

$$\text{Germination rate} = \frac{\textbf{(G1 xN1) + (G2 x N2) + ...(Gn x Nn)}}{\textbf{G1 + G2 + ...Gn}}$$

Where: G = Number of germinated seeds in certain day, N = Number of this certain day.

4-Statistical analysis:

All obtained data of the present study was subjected to the analysis of variance techniques according to the design used by the MSTATC computer software program variance and mean of treatments were compared according to the Least Significant Differences (L. S. D.) test at the 0.05 probability level, method described by **(Bricker, 1991)**.

RESULTS AND DISCUSSIONS

1-Vegetative growth characteristics:

Integrated nutrient management (INM) is a very effective and efficient method to supply nutrients to the plants. The findings of the present investigation revealed

that the combination of different organic manures and inorganic fertilizers significantly affected growth parameters like vine (cm), number of leaves/plant, leaf height (cm), Leaf depth (cm) and number of branches /plant as well as shoot length during the growth period of bottle gourd as shown in (Table 2). Among the treatments, the highest vegetative growth parameters were recorded with treatment T8 [75% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] followed by treatment T9 [50% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed]. However, the lowest mean values in term of vegetative growth traits were observed in treatment T2 (*Azospirllum*/fed). The enhancement of growth may be due to integration effect as *Azospirllum* have soil nitrogen-fixing bacteria which influence and enhance efficiency of nitrogen greater than that of chemical fertilizer which influence growth **Singh and Asrey (2005)** and also due to the organic manure applied in the form of FYM, Poultry Manure might have improved the soil physical and chemical properties and leading to the adequate supply of nutrients to the plants which might have promoted the maximum vegetative growth while the minimum plant growth was due to limited availability of nutrients.

The results reported are agree with the results of **Satish *et al*., (2017)** found that organic and inorganic fertilizers at100% RDF of NPK + FYM at 10 t/ ha + Vermicompost at 5 t/ ha + Poultry manure at 2.5 t/ ha. significantly highest vine length, maximum number of nodes branch, maximum length of internodes and maximum no. of branches were recorded bottle gourd**. Yogendra *et al*., (2018)** on bottle gourd and illustrated that the highest vine length, number of branches /plant and leaf area were recorded by the Integrated nutrient with adding (Poultry Manure 2.5t/ha + half NPK through chemical fertilizer). Also, **Patle *et al*., (2018)** they mentioned that the growth parameters like main vine length and intermodal length of bottle gourd significantly increased with the combination with application of 50% RDCF at the rate of 50 kg N, 25 kg P_2O_5, 25kg K_2O/ ha with the dose of fertilizers in combination with FYM 2.5 t/ ha, vermicompost 1.65/ ha and *azotobacter* at 5kg. Moreover, **Satish *et al*., (2018)** pointed out that integrated nutrient management treatments on bottle gourd rendered their significant effect on all the vegetative growth characters significantly highest vine length, number of nodes branch, length of internodes and higher number of branches/plant were recorded in 100% RDF of NPK + FYM at 10 t /ha + Vermi compost at 5 t/ ha + Poultry manure at 2.5 t/ ha.

Furthermore, **Santosh *et al*., (2019)** revealed that vine length and number of branches in bottle gourd obtained the highest performance and significantly increased at 30, 60 and 90 DAS 100% NPK through inorganic fertilizer recorded 225.7 q/ ha.

Table (2): Vegetative growth characteristics of bottle gourd as influenced by the Integrated Nutrient Management (INM) application of organic, inorganic and bio- fertilizer during the two summer seasons of 2020/2021.

Treatments	1st season						2nd season					
	Vine height (cm)	No. of leaves/ plant	Leaf height (cm	Leaf depth	No. of branches/ plant	Shoot length	Plant height (cm)	No. of leaves/ plant)	Leaf height (cm	Leaf d cm)epth	No. of branches/ plant	Shoot length
T1	282.7	75	20.5	29.1	9.5	16.2	300	77.1	19.5	26.3	8.7	16.3
T2	173.7	56	16.3	17.8	7.7	10.7	155.2	60.1	17	17	6.1	9.7
T3	225.2	64.7	18.2	23.4	8.1	12.3	211.1	65	19	24	7.5	11
T4	226.2	66	19.3	24.4	8.3	12.7	230.2	67.7	19.1	25.1	7.9	11.6
T5	219.3	60.3	17.3	22	7.9	11.5	199.2	62.2	18.7	23.2	7.2	10.5
T6	285.2	75.3	20.7	26.2	9.6	17.1	312	78	20.1	27	9	17.1
T7	232.5	70	18.7	24.4	8.5	14.8	279.1	70.2	19.2	25.3	8.1	13.2
T8	337.2	85	22.2	30.3	10.7	19.1	362	81.3	23.2	29	10.2	20.2
T9	325.1	81.2	21	26.4	10	17.6	353.1	80.3	21	27	9.7	19.3
T10	219.5	57.3	16.5	21.1	7.7	11	183.5	60.2	18.5	20.3	6.7	10.1
T11	255	73.2	20.3	25.7	9.4	15.7	298.2	73.2	19.7	26	8.3	14.7
L.S.D at 0.05	**12.6**	**6.8**	**1.8**	**4.7**	**1.2**	**2.9**	**13.8**	**6.3**	**3.04**	**3.5**	**1.6**	**2.3**

T1: RDF 70.45.48 (NPK)/fed**.** (cont.). **T2:** *Azospirllum*/fed. **T3:** FYM20m^3/fed. **T4:** 75 % RDF (NPK) + *Azospirllum*/fed. **T5:** 50 % RDF (NPK) + *Azospirllum*/fed. **T6:** 75 % RDF (NPK) + FYM20m^3/fed. **T7:** 50 % RDF

(NPK) + FYM20m^3/fed. **T8:** 75 % RDF (NPK.) + *Azospirllum* +10m^3 FYM/fed. **T9:** 50 % RDF (NPK) + *Azospirllum* +10m^3 FYM/fed. **T10**: *Azospirllum*. + FYM 20m^3/fed. **T11:** 100 % RDF (NPK.) + FYM 20m^3/fed**.**

2- Flowering parameters:

The flowering parameters like days taken of anthsis of female flower, days taken of anthsis of male flower, number of female flower/vine, number of male flower/vine, number of nodes to first male and female flower appears and days required to first male and female flower initiation have been presented in (Table 3). The first male and female were recorded with treatment T8 [75% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] followed by treatment T9 [50% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed]. Whereas, the maximum number of days required bearing first female flower was recorded in treatment T2 (*Azospirllum*/fed). The reduction in days to male and female flower initiation may be due to integration effect as *Azospirllum* have soil nitrogen-fixing bacteria which influence and enhance efficiency of nitrogen greater than that of chemical fertilizer which influence early flowering and earliest node to flowering and also due to the stimulating effect of phosphorus on growth hormones like auxine, gibberlines and cytokinins which induce early flowering (**Singh and Asrey, 2005)**. On the other hand plants of the plots with addition of manure and bio-fertilizers along with inorganic fertilizers took comparatively lesser days for initiation of male and female flowers and minimum number of nodes at which first male and female flower appeared.

Obtained results are in agreement with those indicated by **Bairwa and Fageria (2008)**; **Baghel *et al.* (2017)** and **Nagar *et al.* (2017)** on bottle gourd. "Many investigations have been revealed to similar result in a study on integrated nutrient management in bottle gourd by **Satish *et al*., (2018)** revealed that the plants received 100% RDF of NPK + FYM at 10 t/ ha has minimum days taken for first male as well as female flower initiation that appeared at earliest node for first male and female flower. Also, **Patle *et al*., (2018)** found that the combination with application of 50% RDCF at the rate of 50 kg N, 25 kg P_2O_5, 25kg K_2O/ ha with the dose of fertilizers in combination with FYM 2.5 t/ ha, vermicompost 1.65/ ha and *azotobacter* at 5kg enhanced number of female flowers in bottle gourd". **Yogendra *et al*., (2018) "**revealed that the treatment Poultry Manure at 2.5t/ha +

half N.P.K through chemical fertilizer was the best treatment to appear the 1st male flower days to 1st female flower, node no. to 1st female flower and more no. of male flower, maximum no. of female flower".

Table (3): flowering characters of bottle gourd as influenced by the Integrated Nutrient Management (INM) application of organic, inorganic and bio- fertilizer during the two summer seasons of 2020/2021.

Treatments	1st season				2nd season			
	Days taken of anthsis of male flower	Days taken of anthsis of female flower	No. of male flower	No. of female flower	Days taken of anthsis of male flower	Days taken of anthsis of female flower	No. of male flower	No. of female flower
T1	61.7	61.7	88	15.5	53.2	57.6	88.5	15.7
T2	62.2	62.2	82.8	13.3	55.1	64.1	84	12.1
T3	64	64	84.5	14	54.3	63	87	13.3
T4	61.4	61.4	85.2	14.1	54.2	60.9	87.1	14.1
T5	62	62	84.2	13.8	54.5	63.2	86.7	13
T6	62	62	88	16.9	53.1	58	89.7	16.4
T7	61.4	61.4	86.9	14.7	54	60.1	88.1	14.6
T8	57.5	57.5	99.4	18.7	51.4	57.2	95.1	17.2
T9	58.2	58.2	88.7	17.2	53	57.5	90.2	16.7
T10	62.2	62.2	84	13.5	55	64	84.5	12.5
T11	60.2	60.2	87.5	14.4	53.7	59.2	89.3	15.7
L.S.D at 0.05	**N.S**	**4.8**	**4.0**	**2.4**	**2.8**	**4.5**	**4.7**	**2.3**

T1: RDF 70.45.48 (NPK)/fed. (cont.). **T2:** *Azospirllum*/fed. **T3:** FYM20m^3/fed. **T4:** 75 % RDF (NPK) + *Azospirllum*/fed. **T5:** 50 % RDF (NPK) + *Azospirllum*/fed. **T6:** 75 % RDF (NPK) + FYM20m^3/fed. **T7:** 50 % RDF (NPK) + FYM20m^3/fed. **T8:** 75 % RDF (NPK.) + *Azospirllum* +10m^3 FYM/fed. **T9:** 50 % RDF (NPK) + *Azospirllum* +10m^3 FYM/fed. **T10**: *Azospirllum*. + FYM 20m^3/fed. **T11:** 100 % RDF (NPK.) + FYM 20m^3/fed.

3- Fresh fruit yield characters:

The fruit yield attributing characters i.e. fruit length, fruit width and number of fruit/plant have been presented in Table (4). Results showed significantly higher parameters attributes of bottle gourd towards higher fruit length, fruit width and number of fruit/plant in the application of treatment T8 [75% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] followed by treatment T9 [50% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed]. Meanwhile, the minimum results of yield attributing characters were obtained in treatment T2 (*Azospirllum*/fed) as shown in both experimental seasons. The highest results found is due to luxury supply of nitrogen, phosphorus, potassium, FYM and cattle manure and their effect absorption which the various physiological and metabolic processed especially protein metabolism. "The translocation of these nutrients to the fruiting nodes results in higher fruiting and fruit development. In this situation, flow of assimilates to sink was high and might be the reason of higher fruit length and fruit weight" **(Anjanappa *et al.*, 2012 and Dushyant *et al.*, 2014)**.

"Such results are in agreement with those of **Satish *et al.*, (2017)** mentioned that higher fruit length, fruit width and fruit yield in the application of (100% RDF of NPK + FYM at 10 t/ ha + Vermicompost at 5 t/ ha + Poultry manure at 2.5 t/ ha). Also, **Patle *et al.*, (2018)** pointed out that application of 50% RDCF (50:25:25 NPK kg /ha) + 2.5 t/ ha FYM + 1.65 t/ ha vermicompost and *Azotobacter*, *PSB* each 5 kg/ ha to bottle gourd to be sound integrated practice, where recorded maximum fruit length and fruit yield. Moreover, **Satish *et al.*, (2018)** illustrated that the plants received 100% RDF of NPK + FYM at 10 t/ ha + Vermicompost at 5 t/ha + Poultry manure at 2.5 t/ ha had a beneficial effect on bottle gourd maximum fruit length and fruit yield/ha". "Added to that, **Prasad *et al.*, (2019)** studied the effects of integrated nutrient management on bottle gourd and found that the highest fruit length and fruit yield were obtained by adding FYM at 10 t /ha + vermicompost at 0.25 t /ha + half of recommended NPK. **Santosh *et al.*, (2019)** indicated that fruit yield of bottle gourd significantly increased due to different inorganic and organic fertilizer; 100% inorganic fertilizer followed by 50 % NPK through inorganic fertilizer + 50% N through FYM".

Table (4): fresh fruit yield and its component of bottle gourd as influenced by the Integrated Nutrient Management (INM) application of organic, inorganic and bio- fertilizer during the two summer seasons of 2020/2021.

Treatments	1st season			2nd season		
	Fruit length (cm)	Fruit width (cm)	No. of fruits /plant	Fruit length (cm)	Fruit width (cm)	No. of fruits /plant
T1	61.2	10.4	3.5	65.1	11.2	3.5
T2	54.6	9.3	2	58.1	8.6	2.2
T3	59.4	10.1	2.7	62	9.6	2.9
T4	59.4	10.4	3	63.1	10.1	3
T5	58.6	10	2.5	60.2	9.2	2.5
T6	61.4	10.6	3.7	66	11.3	3.7
T7	59.8	10.2	3.2	63.5	10.5	3.1
T8	64.6	11.3	4	67.2	12	4
T9	64	11.3	3.8	66.2	11.8	3.9
T10	55.4	10.2	2.2	58.9	9	2.3
T11	60	10.3	3.3	64	10.7	3.1
L.S.D at 0.05	**4.8**	**1.9**	**0.9**	**3.9**	**1.8**	**0.5**

T1: RDF 70.45.48 (NPK)/fed. (cont.). **T2:** *Azospirllum*/fed. **T3:** FYM20m^3/fed. **T4:** 75 % RDF (NPK) + *Azospirllum*/fed. **T5:** 50 % RDF (NPK) + *Azospirllum*/fed. **T6:** 75 % RDF (NPK) + FYM20m^3/fed. **T7:** 50 % RDF (NPK) + FYM20m^3/fed. **T8:** 75 % RDF (NPK.) + *Azospirllum* +10m^3 FYM/fed. **T9:** 50 % RDF (NPK) + *Azospirllum* +10m^3 FYM/fed. **T10**: *Azospirllum*. + FYM 20m^3/fed. **T11:** 100 % RDF (NPK.) + FYM 20m^3/fed**.**

4-**Dry seed yield and its components:**

The influence of integrated nutrient management application of organic, inorganic and bio- fertilizer on dry seed yield and its components of bottle gourd; dry seed weight/fruit, seed index(100 seeds wt. (g), dry seed yield/plant and per fed are presented in Table (5) such data revealed that the application of treatment T8 [75% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] followed by treatment T9 [50% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] significantly increased and gave the

highest dry seed yield components as compared with the other treatments. Meanwhile, the minimum results of dry seed yield and its components yield attributing characters were obtained in treatment T2 (*Azospirllum*/fed) as shown in both experimental seasons.

" In this concern, the highly suitability of INM treatment imparts favorable yield attributes may be due to the favorable soil environment under this treatment"[8]. "The highest dry yield of bottle gourd in the present study is related to the influence of combined effect of organic and inorganic fertilizers. Besides, quick availability of plant nutrient from inorganic sources, balanced C/N ratio, enhanced the synthesis of photosynthetic and production of hormone like substances IAA, GA, amino acids and vitamins resulted in quantitative yield might be due to its additive effect on vegetative growth of the crop ultimately affecting the yield. These results are in harmony with those obtained by" **Pulak and Mandai** and **Thriveni *et al*., (2015)** in bitter gourd, **Kameswari and Narayanamma(2011)** in ridge gourd **Bahadur *et al*.,(2006)** in Chinese cabbage.

Table (5): Dry seed yield and its components of bottle gourd as influenced by the Integrated Nutrient Management (INM) application of organic, inorganic and bio- fertilizer during the two summer seasons of 2020/2021.

Treatments	1st season				2nd season			
	Seed weigh /fruit	Seed index 100 seeds wt. (g)	Dry seed yield (g/plant)	Dry seed yield (kg/fed	Seed weigh /fruit	Seed index 100 seeds wt. (g)	Dry seed yield (g/plant)	Dry seed yield (kg/fed)
T1	102.7	29.8	333.2	600	100.2	31.2	348.2	623.2
T2	66.2	11.6	132	251.5	68.2	13.3	145.2	266.5
T3	84	24.6	215.6	366.9	88.1	28.3	203	391.1
T4	87	23.9	270.7	467.2	93.7	28.5	280	433.2
T5	75.3	22.5	181.5	357.2	76.3	25.2	183.2	365.7
T6	105.2	26	365	650.1	107.2	32	360.8	680.3

T7	92.2	26.1	283	549.6	95.2	30.7	289	490
T8	113	31	422.8	793	120	35	463.1	811.1
T9	110.2	30	420.5	781.8	114	33.2	433.2	778
T10	71.5	20.8	158	338.1	75.2	19.7	170.5	281.3
T11	99.3	27.9	318.7	598	99.5	31	289.5	557.7
L.S.D at 0.05	**6.9**	**2.8**	**20.3**	**51.4**	**7.4**	**3.9**	**20.7**	**22.6**

T1: RDF 70.45.48 (NPK)/fed. (cont.). **T2:** *Azospirllum*/fed. **T3:** FYM20m^3/fed. **T4:** 75 % RDF (NPK) + *Azospirllum*/fed. **T5:** 50 % RDF (NPK) + *Azospirllum*/fed. **T6:** 75 % RDF (NPK) + FYM20m^3/fed. **T7:** 50 % RDF (NPK) + FYM20m^3/fed. **T8:** 75 % RDF (NPK.) + *Azospirllum* +10m^3 FYM/fed. **T9:** 50 % RDF (NPK) + *Azospirllum* +10m^3 FYM/fed. **T10**: *Azospirllum*. + FYM 20m^3/fed. **T11:** 100 % RDF (NPK.) + FYM 20m^3/fed**.**

5-Seed germination tests:

Regarding to the influence of integrated nutrient management (INM) applications of organic, inorganic and bio- fertilizer on bottle gourd dry seeds to evaluate germination tests i.e. seed germination ratio (%), root length (cm) and sprout length (cm), It is clear from data Table (6), such data indicated that all studied treatments led to a significant increase in seed germination ratio, root length (cm) and sprout length. It is also noticed that that the application of treatment T8 [75% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] followed by treatment T9 [50% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] were the best treatments to obtained high seed germination tests as compared with the other treatments. Whereas, the minimum values of seed germination ratio, root length (cm) and sprout length were obtained in treatment T2 (*Azospirllum*/fed). These results are true during the both seasons.

Table (6): Germination ratio (%) , germination rate(days) and sprout length(cm) of bottle gourd as influenced by the Integrated Nutrient Management (INM) application of organic, inorganic and bio- fertilizer during the two summer seasons of 2020/2021.

Treatments	**1st season**			**2nd season**		
	Germination ratio%	**Sprout length(cm)**	**Root length(cm)**	**Germination ratio%**	**Sprout length(cm)**	**Root length(cm)**
T1	88.2	33.9	16	93	30.2	17

T2	77.8	24.2	11.2	86	22.1	13.3
T3	78.2	28.9	13	88.7	26.2	14.9
T4	85.5	28.5	13.6	90.3	27.3	15.1
T5	80	25.7	12.7	88.5	25.5	14.2
T6	88.1	35.2	16.2	94	33	17.2
T7	85.7	30.2	11.6	90.5	28.9	16.1
T8	92.7	37.1	17.5	95	39	25.9
T9	90.7	37	16.7	94.3	38.2	17.2
T10	79.2	25	11.2	86.2	23.7	13.7
T11	86	31	15.3	92	32.2	17.3
L.S.D at 0.05	**5.7**	**4.2**	**2.6**	**N.S**	**4.3**	**3.1**

T1: RDF 70.45.48 (NPK)/fed. (cont.). **T2:** *Azospirllum*/fed. **T3:** FYM20m^3/fed. **T4:** 75 % RDF (NPK) + *Azospirllum*/fed. **T5:** 50 % RDF (NPK) + *Azospirllum*/fed. **T6:** 75 % RDF (NPK) + FYM20m^3/fed. **T7:** 50 % RDF (NPK) + FYM20m^3/fed. **T8:** 75 % RDF (NPK.) + *Azospirllum* +10m^3 FYM/fed. **T9:** 50 % RDF (NPK) + *Azospirllum* +10m^3 FYM/fed. **T10**: *Azospirllum*. + FYM 20m^3/fed. **T11:** 100 % RDF (NPK.) + FYM 20m^3/fed**.**

CONCLUSION:

On the basis of above findings, it is concluded that the treatment T8 [75% RDF (NPK) + *Azospirllum* +10m^3 FYM/fed] was recorded the best among all the treatment combinations through Integrated nutrient management (INM) in terms of vegetative growth, flowering characters, fruit yield attributing parameters and dry seed yield and its components as well as seed quality of bottle gourd. These results are in support of earliness and higher yield of bottle gourd through INM practices.

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تقييم الادارة المتكاملة للأسمدة على النمو والانتاج البذري لليقطين تحت ظروف محافظه سوهاج.

محسن شحاتة محمد و اشرف يحي اسماعيل و يحي عاشور محمد
قسم بجوث تكنولوجيا انتاج تقاوي الخضر- معهد بحوث البساتين- مركز البحوث الزراعيه

الجيزه- مصر

اجريت هذه التجربه الحقليه بمحطه بحوث شندويل- محافظه سوهاج- مركز البحوث الزراعيه- جمهوريه مصر العربيه خلال الموسمين الصيفيين لعامي 2020 ,2021 بهدف دراسه تقييم الاداره المتكاملة للاسمده مثل الاسمده الكيماوية والاسمده الحيوية وكذا الاسمده العضوية علي صفات النمو الخضري وصفات التزهير ومكونات المحصول الثمري والمحصول البذري الجاف ومكوناته وكذا صفات الجوده للبذور علي محصول اليقطين. وقد صممت التجربه بتصميم القطاعات كامله العشوائيه في ثلاث مكررات. وقد اظهرت النتائج ان اضافة الاسمده في مخلوط متكامل بمعدل 75% من السماد الكيماوي + التسميد الحيوي + التسميد العضوي بمعدل 10 م^3 ادي الي زياده في جميع الصفات المدروسه مثل صفات النمو الخضري وصفات التزهير ومكونات المحصول الثمري والمحصول البذري الجاف ومكوناته وكذا صفات الجوده والمحصول البذري الجاف ومكوناته وكذا صفات الجوده للبذور متبوعا باضافة الاسمده في مخلوط متكامل بمعدل 50% من السماد الكيماوي + التسميد الحيوي + التسميد العضوي بمعدل 10 م^3 . بينما ادي اضافة السماد الحيوي منفردا للحصول علي اقل القيم للصفات المدروسة.