



# RESPONSE OF ONION PLANT TO THE HUMIC ACID APPLICATION AND SPRAYING WITH LIQUID FERTILIZER ON GROWTH AND YIELD OF GREEN ONION

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## Abstract

The study was conducted in vegetable farm trails, Horticulture and Landscape Design Department, College of Agriculture and Forestry, Univ. of Mosul, during the growing season 2017/2018, to study the effect of Granular Orgo power fertilizer as soil application and the liquid fertilizer Botminn, as foliar application on two local onion cultivars namely Red and White *cv.* Which widely cultivate in Iraq. Plants were treated with 150 kg/ha. of granular orgo power as a soil application at 2-true stage leaves, plants were spraying twice with three levels (Zero, 2 and 3 ml/L.) of Botminn, first on 15/1/2018 and the second after two weeks from the first. Results indicated that Orgo power and Botminn have a positive effects on most studies traits. It is clear that Botminn was superior, particularly at the high level 3 ml/L. as it resulted in highest biological yield 8.126 ton/ha., while Red *cv.* gave 7.705 ton/ha. As fresh yield. The interaction between cultivars and fertilizers was significantly affected traits.

## Introduction

Onion *Allium cepa* L. belongs to Alliaceae family, it's one of important vegetable crops in Iraq, which is cultivate in a wide region compared with the other vegetable crops. Onion used as fresh yield. Onion plant rich in Ca and carbohydrates, Fe, Thiamin, vitamin A, Riboflavin and ascorbic acid. Onion is a biennial herbaceous plant and consider as cool season crops (Hasan, 2011). Fresh onion production facing obstacles or constraints, resulting in reducing the cultivated area and decreasing the production per unit area (Cosit, 2008, 2011) as a result of genetic shift of the local cultivars, and the implement of conventional methods or traditional. Today the world going towards application of the new technology (Organic farming) in order to overcome constraints and enhance the productivity. The organic farming aims to maintain human health, and protect the environment (Holcha *et al.*, 2004).

The present research aimed to study the effect of granular orgo power fertilizer as soil application and botminn as foliar on growth and fresh yield of two local onion cultivars under the conditions of Mosul province.

## Materials and Methods

The study was conducted in vegetables farm trials Horticulture and Landscape Design, College of Agriculture and Forestry, University of Mosul, during the season 2017/2018. Tow local cultivars namely Red *cv.* and White *cv.* were planted on 21/11/2017. Granular orgo power fertilizer was used at the rate 150 kg/ha. as a soil application when the plants at 2-true leaf stage, plants were sprayed twice with three levels (zero, 2 and 3 ml/L.) as foliar application of botminn, first on 15/1/2018, the second after two weeks from the first until drip off. Factorial experiment in a randomized complete blocks design with three replicates was applied. Data analyzed statistically according to (SAS, 2017) programme.

## Results and Discussion

Table 1 showed that plant height was affected significantly by the interaction between cultivars and botminn, and triple interaction. Cultivars responded significantly for the traits of the number of leaves per plant; White *cv.* surpassed Red *cv.* as it gave 7.804 compared with Red *cv.* which gave 7.352 leaves/plant. Botminn treatment affected significantly and gave 7.935 leaves/plant compared with the control treatment. The

**Table 1:** Effect of cultivars, orgo power, Botminn and their interaction on plant height (cm).

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	---	55.20 a	51.66 b	54.83 ab	53.89 a	54.59 a
	+	54.83 ab	55.59 a	55.43 a	55.28 a	
White	---	54.88 ab	56.72 a	54.32 ab	55.31 a	55.03 a
	+	53.42 ab	56.00 a	54.88 ab	54.76 a	
Botminn X Cultivars	Red	55.01 ab	53.63 b	55.13 ab	Mean	
	White	54.15 ab	56.36 a	54.60 ab	effects	
Orgo power	---	55.04 a	54.19 a	54.57 a	54.60 a	
X Botminn	+	54.12 a	55.79 a	55.16 a	55.02 a	
Mean effect Botminn	54.58 a	54.86 a	54.99 a			

Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05.

**Table 2:** Effect of cultivars, orgo power, Botminn and their interaction on number of leaves/plant.

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	---	6.746 d	7.413 bcd	7.413 bcd	7.191 c	7.352 b
	+	7.440 bcd	7.576 bc	7.523 bc	7.513 b	
White	---	8.00 ab	8.30 a	7.786 ab	8.028 a	7.904 a
	+	7.00 cd	8.453 a	7.886 ab	7.780 ab	
Botminn X Cultivars	Red	7.093 c	7.495 bc	7.468 bc	Mean	
	White	7.500 bc	8.376 a	7.836 b	effect	
Orgo power	---	7.373 bc	7.856 ab	7.60 abc	7.610 a	
X Botminn	+	7.220 c	8.015 a	7.705 abc	7.646 a	
Mean effect Botminn		7.296 b	7.652 a	7.935 a		

Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05.

**Table 3:** Effect of cultivars, orgo power, Botminn and their interaction on leaves fresh weight (gm).

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	---	21.83 h	33.06 def	29.86 efg	28.25 b	34.09 b
	+	27.20 g	48.70 a	43.90 ab	39.93 a	
White	---	34.93 de	36.09 cd	45.40 ab	38.80 a	38.05 a
	+	28.40 fg	42.50 b	41.00 bc	37.30 a	
Botminn X Cultivars	Red	24.51 e	40.88 ab	36.88 c	Mean	
	White	31.66 e	39.29 bc	43.20 a	effect	
Orgo power	---	28.38 c	34.57 b	37.63 b	33.53 b	
X Botminn	+	27.80 c	45.60 a	42.45 a	38.61 a	
Mean effect Botminn		28.09 a	40.04 a	40.08 a		

Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05.

interaction and the first order interaction were significantly affected on the number of leaves/plant table 2. The results in table 3 revealed that the white cv. differed significantly from Red cv. in leaves, fresh weight, it gave 38.05 gm. plant, the orgo power application resulted in 38.61 gm. plant, while spraying with botminn gave 40.08 gm. plant for this traits. Results showed a significant effects of all interaction on leaves fresh weight/plant. It was obvious from table 4 that botminn applications caused a significant increment in plant fresh weight, the highest level gave 76.18 gm.plant, compared with 58.46 for control treatment. Results showed a significant differences between interaction treatment between cultivar x botminn and orgo power x botminn, also there were a significant differs between triple interaction treatments.

The results in table 5 indicated to a significant effect of botminn which gave a positive response, specially the high level as it gave 24.70 compared with the lowest value 17.68 in control treatment. The interaction between cultivars x botminn and orgo power x botminn were significant, similarly the first order interaction was also significant. Table 6 showed a significant differences and the treatment with 3ml.l. was superior than the others, it gave 11.78 gm/plant compared with control 9.408 gm/plant in the bulb fresh weight. Results showed that off the double and first order interaction treatments had a significant effect on bulb fresh weight. The figures in table 7 revealed that spraying with botminn caused a significant increments in the neck fresh weight and the highest value was with 3ml/l. treatment 12.91 gm. plant compared with 8.275 gm. plant in control treatment. It was obvious that all the double and triple interaction treatments had a significant effect on neck fresh weight. Table 8 showed that there was a significant effect of botminn

**Table 4:** Effect of cultivars, orgo power, Botminn and their interaction on fresh weight of plant (gm/plant).

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	--	51.50 c	80.80 ab	93.10 a	75.13 a	72.24 a
	+	56.66 c	79.84 ab	71.53 bc	69.34 a	
White	--	63.93 bc	56.50 bc	68.70 bc	66.04 a	68.49 a
	+	61.76 bc	79.66 ab	71.41 bc	70.94 a	
Botminn X Cultivars	Red	54.08 c	80.32 a	82.31 a	Mean effect	
	White	62.85 bc	72.58 ab	70.05 ab		
Orgo power	--	57.71 c	73.15 a	80.90 a	70.58 a	
X Botminn	+	59.21 bc	79.75 a	71.47 ab	70.14 a	
Mean effect Botminn		58.46 b	76.45 a	76.18 a		

\*Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05.

**Table 5:** Effect of cultivars, orgo power, Botminn and their interaction on neck fresh weight (gm).

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	--	16.00 e	19.86 cde	22.80 bcd	19.55 a	21.34 a
	+	15.80 e	29.00 a	24.60 abc	23.13 a	
White	--	20.66 cd	24.36 abc	25.60 ab	23.54 a	23.01 a
	+	18.26 de	23.40 bc	25.80 ab	22.48 a	
Botminn X Cultivars	Red	15.00 c	24.23 a	23.70 a	Mean effect	
	White	19.46 b	23.88 a	25.70 a		
Orgo power	--	18.33 c	22.17 b	24.20 ab	21.55 a	
X Botminn	+	17.03 c	26.70 a	25.20 b	22.81 a	
Mean effect Botminn		17.68 b	24.15 a	24.70 a		

Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05.

**Table 6:** Effect of cultivars, orgo power, Botminn and their interaction on bulb fresh weight (gm/plant).

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	--	9.033 cd	12.40 b	11.80 bc	11.07 ab	10.43 a
	+	8.400 d	10.40 bcd	10.60 bcd	9.80 b	
White	--	10.20 bcd	11.53 bc	11.93 bc	11.22 ab	12.01 a
	+	10.00 bcd	15.60 a	12.80 b	12.80 a	
Botminn X Cultivars	Red	8.716 d	11.40 bc	11.20 bc	Mean effect	
	White	10.10 cd	13.56 a	12.36 ab		
Orgo power	--	9.616 b	11.96 a	11.86 a	11.15 a	
X Botminn	+	9.200 b	13.00 a	11.70 a	11.30 a	
Mean effect Botminn		9.408 b	12.48 a	11.78 a		

\*Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05.

treatments, as the plant treatment with 3ml/l resulted the highest value 8.126 ton/ha. In the biological yield, while control treatment gave 6.236 ton/ha. For the biological yield.

The interpretation of the differences between cultivars attributed to the genetic potential and their interaction with the environmental conditions in addition to the agricultural practices. Regarding orgo power, it contain humic acid, m which in turn improve growth and increase plant ability to resist stress, in addition to organic hormone levels in plant (Piccola *et al.*, 1992), also humic posses nutrient elements which are more available due to increase the absorption of some elements such as Ca, K, Mg and P (Hartwigson and Evans, 2000). Aa well as orgo power contain folic acid which improve growth and give healthy plants, it's also contain boron element, which is important in plant nutrition, boron play a role in sugars transportation in plant. Also orgo power contain the organic matter which improve soil physical and chemical properties, and the availability of the nutrient elements, and increase soil water holding capacity. Botminn contain humic acid which have a role in reducing the negative effects of the chemical fertilizers (Singer *et al.*, 1998; Hartwigson and Evans, 2000). Also botminn contain folic acid and organic matter in addition to nitrogen and potassium oxide. The positive due to spraying treatment attributed to the absence of doubling in the treated plants (Al-Khasy, 2008; Al-Obedee, 2012).

The conclusion derived from this study that botminn alone or with cultivars and orgo power interactions gave the best results in the studied parameters, the first order interaction between the Red cv. with zero orgo power and 3ml/l of botminn resulted in the highest biological yield 9.931 ton/ha. There for, we recommended to use organic fertilizers as a foliar application for this crop.

**Table 7:** Effect of cultivars, orgo power, Botminn and their interaction on neck fresh weight (gm/plant).\*

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	---	9.667 e	7.467 e	11.00 bcde	8.478 b	10.90 a
	+	7.4 e	18.60 a	14.00 b	13.33 a	
White	---	10.46 bcde	12.83 bcd	13.66 b	12.32 ab	11.00 a
	+	8.267 cde	7.8 de	13.00 bc	9.689 ab	
Botminn X Cultivars	Red	7.183 c	13.03 a	12.5 ab	Mean effect	
	White	9.367 bc	10.3 abc	13.33 a		
Orgo power	---	8.717 b	10.15 ab	12.33 a	10.40 a	
X Botminn	+	7.833 b	13.2 a	13.50 a	11.51 a	
Mean effect Botminn		8.275 b	11.67 a	12.91 a		

Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05.

**Table 8:** Effect of cultivars, orgo power, Botminn and their interaction on biological yield (ton/ha.).

Cultivars	Orgo power	Botminn			Cultivars X Orgo power	Mean effect cultivars
		0 ml/l	2ml/l	3ml/l		
Red	---	5.493 c	8.618 ab	9.931 a	8.014 a	7.705 a
	+	6.044 c	8.516 ab	7.630 bc	7.397 a	
White	---	6.819 bc	6.986 bc	7.328 bc	7.044 a	7.306 a
	+	6.588 bc	8.497 ab	7.617 bc	7.567 a	
Botminn X Cultivars	Red	5.768 c	8.567 a	8.780 a	Mean effect	
	White	6.704 bc	7.742 ab	7.472 ab	7.529 a	
Orgo power	---	6.156 c	7.80 a	8.629 a	7.482 a	
X Botminn	+	6.316 bc	8.507 a	7.623 ab		
Mean effect Botminn		6.236 b	8.154 a	8.126 a		

\*Means with the same letters had no significant differences according to Dinacn's multiple range test at probability 0.05

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