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**RESPONSE OF EARLY SOWING PEA CROP TO SOME  
NATURAL AND CHEMICAL SUBSTANCES FOR IMPROVING  
YIELD AND QUALITY COMPONENTS.**

**By**

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## 5. SUMMARY AND CONCLUSION

The present study was conducted at Private Farm in El-Gammalia District, Dakahlia Governorate, Egypt during winter seasons of 2016 and 2017 to study the effect of some natural and chemical substances (effective microorganisms at 2l/fed, humic acid at 2kg/fed, moringa leaf extract (MLE) at 1ml/ 32 ml, yeast extract 50 ml/ l, potassium citrate 5 ml/l and silicon 300 ppm as well as boron 50 ppm) on vegetative growth, pod yield, quality and storability of early sowing pea crop.

The experimental layout was split-plot system in a randomized complete blocks design with three replicates. This experiment included 24 treatments which were the combination between 4 soil applications and 6 foliar applications. The soil applications were randomly arranged in the main plots, while the foliar applications were randomly distributed in the sub-plots. The treatments were arranged as follow:

### **a. Soil applications:**

- 1- EM 2 l/ fed.
- 2- Humic acid 2 kg/fed.
- 3- Humic acid 2 kg / fed + EM 2 l/ fed.
- 4- Control.

### **b. Foliar applications:**

- 1- Moringa leaf extract at 1ml/32ml.
- 2- Yeast extract at 50 ml/L.
- 3- Potassium citrate at 5 ml/ L.
- 4- Silicon in form of (silicic acid, Si (OH) <sub>4</sub>) at 200 ppm.
- 5- Boron at 50 ppm.
- 6- Control (sprayed with tap water).

Solution of above substances were sprayed three times, i.e., 15, 25 and 35 days after sowing.

The obtained results of the present study were statistically analyzed and could be summarized as follows:

## **5.1. Vegetative growth**

### **5.1.1-Effect of soil applications:**

All studied soil applications had significant effect on all vegetative growth characters, i.e., plant height, number of leaves and branches/plant, leaf area/plant and fresh and dry weight/plant in both seasons compared with control. However, EM + humic acid had higher values than other soil applications in all aforementioned characters followed by EM, whereas the least one was control in both seasons.

### **5.1.2-Effect of foliar applications:**

All foliar applications significantly increased all studied vegetative growth characters, i.e., plant height, number of leaves and branches/plant, leaf area/plant and fresh and dry weight/plant in both seasons. The best application in all studied treatments was moringa leaf extract followed by yeast extract and potassium citrate in both seasons.

### **5.1.4-Effect of the interactions:**

The effects of all interactions were significant in plant height, number of leaves and branches/plant, leaf area/plant and fresh and dry weight/plant in both seasons.

In general, the best interaction in all studied characters was (EM + humic acid and moringa leaf extract) followed by (EM + humic acid and yeast extract) and (EM + humic acid and potassium citrate) in the two seasons, respectively. While, the lowest one was control in both seasons.

## **5.2. Pod yield and its components**

### **5.2.1-Effect of soil applications:**

All studied soil applications had significant effect on pod yield and its components (number of pods/plant, average pod weight, pod yield/plant, total pod yield/fed, pod length, pod diameter and pod thickness) in both seasons. While, the lowest one was control in both seasons.

### **5.2.3-Effect of foliar applications:**

All foliar applications significantly affected all studied parameters, i.e., number of pods/plant, average pod weight, pod yield/plant, total pod yield/fed, pod length, pod diameter and pod thickness. compared with the control in both seasons.

The highest were obtained when pea plants sprayed with moringa leaf extract followed by yeast extract and potassium citrate foliar applications in both seasons, respectively.

#### **5.2.4-Effect of the interactions:**

The effect of all interactions were significant in number of pods/plant, average pod weight, pod yield/plant, total pod yield/feddan, pod length, diameter and thickness in the two seasons compared with the control.

Generally, EM + humic acid and spraying with moringa leaf extract recorded the highest values of studied parameters followed by EM + humic acid and spraying with yeast extract in the two seasons, respectively. While, the lowest one was control in both seasons.

### **5.3.Chemical composition of leaves and pods**

#### **5.3.1-Effect of soil application:**

As for, N, P and K contents of pea leaves, the effect of soil application on previous parameters was significantly in both seasons. EM + humic acid were higher than other soil application in N, P and K contents in both seasons.

Regarding, all studied soil applications had significant effect on chlorophyll a, b and total chlorophyll compared with control in both studied seasons. Soil applications pea plants with EM+ humic acid recorded the highest content of leaf pigments of chlorophyll a, b and total chlorophyll followed by EM and humic acid in both seasons, respectively, meanwhile the control treatment recorded the lowest contents of these pigments.

Concerning N, P, K and protein contents of pea pods, the effect of soil application on previous parameters was significantly in both seasons. EM + humic acid were higher than other soil application in N, P, K and protein contents in first and second seasons.

As for reducing, non-reducing and total sugars and carbohydrate contents, the differences among soil application were significantly in the two studied seasons. However, EM + humic acid were the highest in previous characters followed by EM and humic acid, respectively in both seasons.

All soil application was significantly differed in total soluble solids (TSS), vitamin C and titratable acidity contents in both seasons, meanwhile EM + humic acid

recorded the highest total soluble solids (TSS), vitamin C and recorded the lowest content of titratable acidity followed by EM and humic acid, respectively in both seasons.

### **5.3.3-Effect of foliar applications:**

All foliar applications increased N, P, K, chlorophyll a, b and total chlorophyll contents of pea leaves compared with control in both seasons.

Spraying pea plants with moringa leaf extract gave the highest values of previous characters, while the lowest values were recorded by control.

All foliar applications increased total soluble solids (TSS), vitamin C, N, P, K and protein contents of pea pods and decreased titratable acidity contents compared with control in both seasons.

Reducing, non-reducing and total sugars and carbohydrate contents significantly affected by foliar applications compared with the control in both season. Spraying pea plants with moringa leaf extract gave the highest values of previous characters, while the lowest values was recorded by control.

### **5.3.4-Effect of the interactions:**

Regarding, N, P and K contents of pea leaves significantly affected by all interactions compared with the (control and without) in both season. Treatment pea plants with EM + humic acid and sprayed with moringa leaf extract gave the highest values of previous characters, while the lowest values was recorded by (control and without) in both seasons.

The effects of all interactions were significant in chlorophyll a, b and total chlorophyll contents of pea leaves in the two seasons compared with the control. Generally, EM + humic acid and spraying with moringa leaf extract recorded the highest values chlorophyll a, b and total chlorophyll contents of pea leaves, While, the lowest one was (control and without) in both seasons.

The highest values of N, P, K and protein contents of pea pods were observed when EM + humic acid and sprayed with moringa leaf extract, while the lowest values of previous characters was recorded by (control and without) in both seasons.

In general, when EM + humic acid and sprayed with moringa extract, reducing, non-reducing and total sugars and carbohydrate contents recorded the highest values. The lowest values were recorded when (control and without) in the two seasons.

EM + humic acid and sprayed with moringa leaf extract recorded the highest values of total soluble solids and vitamin C in both season and decreased titratable acidity in both seasons, while the lowest values of previous characters, recorded the highest values of titratable acidity contents was recorded by (control and without) in both seasons.

## **5.4.Storability**

### **5.4.1-Effect of soil applications:**

All studied soil applications differed significantly in total soluble solids (TSS), vitamin C and titratable acidity contents of their pods during storage. EM + humic acid recorded the highest TSS, vitamin C and the lowest acidity content during storage.

Concerning pod weight loss during storage at 5, 10 and 15 days, all studied soil applications differed significantly for previous characters. EM + humic acid recorded the lowest weight loss in first and second season at 5, 10 and 15 days compared with other treatments.

### **5.4.2-Effect of foliar applications:**

All foliar applications significantly increased total soluble solids (TSS), vitamin C, and decreased titratable acidity contents of pod during storage compared with untreated plants. Sprayed pea plants with moringa leaf extract recorded the highest values of total soluble solids (TSS) and vitamin C contents and decreased titratable acidity contents compared with other treatments.

All foliar applications decreased pod weight loss during storage compared with the control. Pea plants sprayed with moringa leaf extract recorded the lowest pod weight loss at 5, 10 and 15 days during storage followed by yeast extract, respectively in both seasons.

### **5.4.4-Effect of the interactions:**

EM + humic acid and sprayed with moringa leaf extract recorded the highest values of total soluble solids, vitamin C and recorded the lowest values of titratable acidity contents, while (control and without) recorded the lowest total soluble solids, vitamin C and the highest titratable acidity.



Concerning weight loss during storage, EM + humic acid and sprayed with moringa leaf extract recorded the lowest weight loss at 5, 10 and 15 days during storage, while the highest weight loss at 5, 10 and 15 days during storage were obtained when (control and without) in two seasons.

## **CONCLUSION**

It could be concluded that using EM + humic soil and spraying with moringa leaf extract or yeast extract at 50 ml/L or potassium citrate at 5 ml/L under early sowing pea crops and high temperature conditions for local consumption three times, i.e., 15 days after sowing then repeated each 10 days interval, to achieve the highest productivity and produced high quality and storability. It has been noticed that soil applications responded significantly to different foliar applications, thus it must conduct more researches for improving production and quality under local environmental conditions.