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## SUMMARY

This study was carried out at the Experimental Farm of Floriculture, Faculty of Agriculture, Assiut University during the two successive seasons of 200/2001 and 2001/2002. The objective of this work was to study the response of henna (*Lawsonia alba*, Lam.) plant to some agricultural factors which may improve its growth and /or active substances, such as soil, nitrogen as organic or inorganic form, sulphur, cycocel and active dry yeast.

The studied parameters were vegetative growth, yield, active substances (lawsone and tannins), photosynthetic pigments, total carbohydrates, as well as nitrogen, phosphorus, potassium and protein contents in leaves.

Three separate experiments were established:

### **First Experiment (sulphur to reduce nitrogen requirements):**

This field experiment aimed to study the response of henna plant to certain levels of nitrogen and sulphur applications. The treatments were arranged as a split-plot in a randomized complete blocks design (RCBD) with four replicates. Three main plots comprehend the nitrogen levels; 0 (control), 200 and 400 kg ammonium nitrate (33.5 % N) per feddan/season. The sub-plots contained sulphur levels viz. 0 (control), 0.6 and 1.2 tons per feddan. Each sub-plot was 3 meters length by 2.4 meters width with three rows 60 apart and the distance between each two plants was 30 cm.

The amount of nitrogen and sulphur application per feddan was added in six equal doses, three of them for each cut. The amount for each cut was divided into three equal doses. The first dose started directly on the 1st week of April and August in both seasons for the first and second cuts, respectively. Whereas, the second and third ones were performed at 30 days

interval. The finely ground sulphur was mixed with the soil surface around the plants before irrigation. This was repeated in the same manner in the second season (2001/2002).

The obtained data were statistically analyzed and the main results are summarized in the following:

- 1) In general, application of any used nitrogen or sulphur level resulted in highly significant increments in most vegetative growth parameters of henna plant as well as leaves content of active substances (lawsone and tannins), photosynthetic pigments, total carbohydrates, nitrogen, phosphorus and potassium compared to the control.
- 2) Also, in most cases of the experiment, using either high nitrogen or sulphur level as a soil application resulted in highly significant increments in growth parameters, active substances and leaf chemical analysis compared to the low one,
- 3) The interaction effects between nitrogen and sulphur levels on the most studied parameters varied from significant to insignificant. But in general, the best results on most of the studied parameters were obtained by applying both nitrogen and sulphur at the highest level.

### **Second Experiment (yeast drenching in soil types):**

A pot experiment was carried out to study the response of henna (*Lawsonia alba*, Lam.) plant to grow in four different soil types and application of active dry yeast (*Saccharomyces cerevisiae*). A split-plot in RCBD with three replicates was followed. The main plots represented soil types. Each main plot was divided into four sub-plots which represented active dry yeast levels; 2, 4 and 8 g/l, besides control treatment. Each sub-plot contained six pots

The levels of active dry yeast were applied as a soil drench at the rate of 50 ml/plant for each one, added three times for each cut at biweekly interval a week after each of April and August for first and second cuts, respectively in both seasons.

The obtained results are summarized as follows:

- 1) In general, growing henna plants in a clay loamy soil or in its mixtures with loamy sand soil had the greatest effect on increasing most of the studied growth parameters, leaf content of active substances (lawsone and tannins), total carbohydrates and photosynthetic pigments as well as nitrogen, phosphorus and potassium contents compared to either silt clay loamy or loamy sand soil. Meanwhile, the silt clay loamy soil showed the least effect on most vegetative growth parameters and leaf analysis. Likewise, loamy sand soil had the least effect on leaves content of tannins, nitrogen and protein compared to the other used soils.
- 2) Drenching any used level of active dry yeast to the soil regardless its type resulted in highly significant increments in most studied of the growth parameters and leaves analysis compared to untreated plants. Also, Applying yeast to the soil at the high or moderate levels resulted in highly significant increments in most studied vegetative growth parameters and leaf analysis compared to that in the low one.
- 3) The interaction effects between soil types and active dry yeast levels were significant in most cases for leaves fresh weight, total fresh weight and leaves content of tannins, phosphorus and potassium. The other interaction effects varied from significant to insignificant from one season to another. But in general favourable improvements were resulted from growing henna plants in clay loamy soil or in its



mixtures with loamy sand soil and drenching with high or moderate level of yeast.

### Third Experiment (cycocel to branch henna under organic manuring:)

This investigation was carried out in a pot experiment and aimed to study the effect of farmyard manure mixtures in soil and foliar application of cycocel on growth and chemical composition of henna (*Lawsonia alba*, Lam.) plant. The treatments were arranged as a split-plot in a randomized complete block design (RCBD) with four replicates. The main plots represented tested farmyard treatments soils : farmyard manure by volume; 1:0, 4:1, 2:1 and 1:1. The sub-plots contained cycocel levels viz . 0, 2, 4 and 8 ml/l.

The plants were sprayed with cycocel levels twice per each cut in both seasons. The first spray was done on the first week of May and September for first and second cuts, respectively in both seasons. Whereas, the second one was sprayed three weeks later.

The obtained data were statistically analyzed and the main results are summarized in the following:

- 1) In general, mixing farmyard manure in the soil increased most of the vegetative growth parameters and leaves content of active substances (lawsone and tannins), total carbohydrates, photosynthetic pigments as well as leaves mineral content of nitrogen, phosphorus and potassium compared to the control. Also, increasing the ratio of manure in the soil in 2:1 or 1:1 resulted in a significant increment in most of the studied parameters compared to the control or low ratio (4: 1). There were non significant differences between mixing soil and manure mixtures at ratios of 1:1 and 1:2 on most of the studied parameters.

- 2) Foliar application of cycocel at any used level significantly reduced plant height. Meanwhile, treated henna plants with cycocel up to 4 ml/l resulted in significant increments in the most of the vegetative growth parameters as well as leaves content of active substances, total carbohydrates, photosynthetic pigments as well as N, P, and K compared to the control or high level (8 ml/l).
- 3) The interaction effects between mixing farmyard manure in soil and cycocel levels varied from significant to insignificant. But in general, promising results were obtained when plants were grown in a soil containing manure at ratio of 1:1 or 2:1 and sprayed with the moderate level of cycocel (4 ml/l).