

The Use of Kelpak to Seedlings Loquat (*Eriobotrya japonica L.*)

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Abstract- Liquid fertilizers derived from seaweeds are found to be superior to chemical fertilizers due to high level of organic matter, micro and macro elements, vitamins and fatty acids and also rich in growth regulators. Loquat seedlings *Eriobotrya japonica* grow slowly under nursery conditions, usually stay for a long time until a diameter up to appropriate size for budding and thus reach the ready size for the sale, this investigation aimed to improve the vegetative growth of the seedlings by studying the effectiveness of concentration and method of application of seaweed concentrate SWC Kelpak consists of natural plant hormones such as auxins (10.7 mg.l⁻¹) and cytokinins (0.03mg.l⁻¹) which is produced from *Ecklonia maxima*, which stimulate growth, on loquat transplants grown at the lathhouse of Agriculture Research Centre, Ainkawa, Erbil, Iraq, during April to August 2010, as soil and foliar application in the following concentrations (0, 1:200, 1:250, 1:300), and the overlap between concentration and method of application to improve the vegetative growth of the seedlings, each treatment was repeated three times through the growing season the interval date between them were 20 days. For the control treatment, pure water was used, Complete Randomized Design (C.R.D) as a factorial experiment design with three replicates.

Results indicated that most treatments led to improve vegetative growth of transplant as compared with control, sprayed with Kelpak at the concentration (1: 250) highest values of these characters were observed in plants which caused a significant Increase of transplant height (29.47cm), increase of diameter of main stem (2.12mm), number of leaves. Transplant⁻¹ (13.85), plant leaf area (713.500cm².p⁻¹), percentage of chlorophyll (55%), leaf. weight (14.81gm), dry weight of leaves (6.07gm) as compared with the control.

As a method of Kelpak application, the foliar application was the effective method comparing with the soil application, since the highest values of these characters were observed in plants sprayed with Kelpak at the concentration (1:250) as foliar application compared with the same concentration as a soil application and control. Significant differences in means between treatment combinations Kelpak concentration and method of application were observed in the vegetative growth contributing characters, the heights increase of transplant height (34.80 cm) was observed in treatment (1:250 Kelpak as foliar application), the lowest value (13.93 cm) was found in (control). The maximum effective increase in diameter of main stem (2.70 mm) was found in treatment (1:250 Kelpak as foliar application which was statistically identical to the treatment (1:300 Kelpak as foliar application), the lowest value (1.03 mm) was found in control.

Index Terms- *Ecklonia maxima*, foliar, kelpak, loquat, soil

I. INTRODUCTION

Seaweeds and their products are used in agriculture and horticulture as soil conditioners, manure, growth stimulants and plant protectants against pests and diseases (VERKLEIJ, 1992). The SWC Kelpak is known for the growth promoting effect it has on plants. Although a variety of compounds have been discovered in the SWC, including hormones such as cytokinins and auxins, none of these fully explain the significant growth promoting effect exerted by the SWC when administered to plants (Nelson and Van Staden, 1984). Adding sea weed to soil directly led to improve physical soil qualities and increase their ability to retain water and the reason is attributed to the sea weed have fiber and amino acid, vitamins and all these materials are combined with soil pellet and increases the molecular weight, which helps to root growth and helps in the growth area increase absorption, leading to increased vegetative growth and increase in leaf size and the proportion of chlorophyll in the leaves, as well as lack of oxidation Chlorophyll in securities. Foliar application can play important role and be very profitable in deficient case of nutrient elements. These elements will be rapidly taken up by the trees and the levels will increase dramatically in the leaves. Moreover, this technique could be enhancing the efficiency of soil application. In order to obtain strong growth seedlings as a root stock for budding in shorten period Kelpak as soil and foliar application is additional information for an alternate to synthetic fertilizers because of the low cost and the impact on health.

Results of the experiment conducted on apple, apricot, peach trees 3 years old , increased diameters of trees when sprayed with Kelpak where there were significant differences in the diameters stem apple trees , but the increase in peach and apricot trees were not significantly (Lourens, 2001) , same results also obtained by (Steenkamp, 2002) when he studied effect of Kelpak in the growth and development of newly planted Shiraz grape vines in order to encourage the entry of plants in the early fruiting. Mohammad (2010) reported that application of used of Kelpak (1:150, 1:200 and 1:250) gave better outcome in most of characteristics of Sorani olive transplant as compared with control.

II. MATERIALS AND METHODS

The present study was conducted at " the lathhouse of Agriculture Research Centre, Ainkawa, Erbil, Iraq", during April to August 2010, as soil and foliar application in the following concentrations (0, 1:200, 1:250, 1:300), and the overlap between concentration and method of application to

improve the vegetative growth of the loquat transplants on one year old, uniform in size and vigor, free from attack of diseases and pests were selected on which given treatments were applied, each treatment was repeated three times through the growing season the interval date between them were 20 days. For the control treatment, pure water was used, Complete Randomized Design (C.R.D) as a factorial experiment design with three replicates. All seedlings received the same agricultural practices. At the end of the growing season (August) of the following determinations were measured for the same seedlings: Increase of transplant height (cm), increase of diameter of main stem (mm), number of leaves per transplant, leaf area (cm^2), plant leaf area ($\text{cm}^2 \cdot \text{p}^{-1}$), percentage of chlorophyll (%), leaf. weight (gm), dry weight of leaves (gm), and percentage of dry material (%).

III. RESULTS AND DISCUSSION

The present value in Table 1 has revealed the consistent and most significant results for growth parameters due to application of kelpak out of four different concentrations, the concentration (1:250) resulted a significant Increase of transplant height (29.47cm), increase of diameter of main stem (2.12mm), number of leaves per transplant(13.85), percentage of chlorophyll (55%), leaf. weight (14.81gm), dry weight of leaves (6.07gm) as compared with the control (14.03cm), (1.05mm), (8.25), ($356.167\text{cm}^2 \cdot \text{p}^{-1}$), (5.35gm) respectively, while the maximame increasing of lef earea (56.26 cm^2), plant leaf earea (717.00 $\text{cm}^2 \cdot \text{p}^{-1}$), Percentage of chlorophyll (55.50 %) responded significantly to the treatment (1:300 Kelpak) which was statistically identical to treatment (1:250 Kelpak). (Louens, 2001, Steenkamp, 2002, Masny and Zurawiez, 2004, Mohammad, 2010). This increase is due to the influence of auxins and cytokinins which contribute to directing and movement of nutrients in the vegetative parts of the plant, increasing constituent parts of the total vegetative (Mothes and Engelbrecht, 1961. Blunden et al., 1997) reported that the seaweed extract applied as foliar spray enhanced the leaf chlorophyll level in plants; this increase in chlorophyll content may be due to a decrease in chlorophyll degradation by betaines, Glycine betaine delays the loss of photosynthetic activity by inhibiting chlorophyll degradation during storage conditions in isolated chloroplasts; Seaweeds extracts contain Betaine which as a nitrogen source may increase this parameter (Genard et al., 1991; Whapham et al., 1993; Blunden et al., 1997).

The results of the study also indicate that the effectiveness of foliar applications with respect to soil applications. It can be seen that foliar applied was most effective at all vegetative growth parameters.

Significant differences in means between treatment combinations Kelpak concentration and method of application were observed in the vegetative growth contributing characters such as: Increase of transplant height (cm), increase of diameter of main stem (mm), number of leaves per transplant, leaf area (cm^2), plant leaf area ($\text{cm}^2 \cdot \text{p}^{-1}$), percentage of chlorophyll (%), leaf. weight (gm), dry weight of leaves (gm), and percentage of dry material (%) responded significantly to the treatments (Table 1). The heights Increase of transplant height (34.80 cm) was observed in treatment (1:250 Kelpak as foliar application), the lowest value (13.93 cm) was found in (control). The maximum

effective increase in diameter of main stem (2.70 mm) was found in treatment (1:250 Kelpak as affoliar application which was statistically identical to the treatment (1:300 Kelpak as foliar application), the lowest value (1.03 mm) was found in control.

Table 1. Effect of Concentration of Kelpak and method of application on vegetative growth characteristics of loquat transplants.

Characterises	Increase of transplant height (cm)	Increase of diameter of main stem(mm)	Number of leaves per transplant	Leaf area (cm ²)	Plant. leaf area (cm ² .p ⁻¹)	Percentage of chlorophyll %	Leaf. Weight (gm)	Dry weight of leaves (gm)	Percentage of dry material %
Con. Kelpak									
0	14.03 d	1.05 d	8.25 c	44.09 d	356.167 c	28.25 c	11.71 d	5.35 c	40.07 d
1:200	26.00 c	1.74 c	12.83 b	50.63 c	632.500 b	49.500 b	13.53 c	5.58 bc	41.59 c
1:250	29.47 a	2.12 a	13.85 a	51.00 b	713.500 a	55.500 a	14.81 a	6.07 a	43.78 b
1:300	26.54 b	2.02 b	12.77 b	56.26 a	717.00 a	55.50 a	14.51 b	5.63 b	44.78 a

Method of application									
Soil	20.19 b	1.316 b	11.32 b	47.77 b	548.000 b	41.500 b	12.26 b	5.38 b	41.64 b
Foliar	27.82 a	2.14 a	12.29 a	53.23 a	661.583 a	52.875 a	15.02 a	5.93 a	43.47 a

Con. Kelpak and method of application										
0	Soil application	13.93 g	1.03 e	8.04 c	43.96 f	353 g	28 g	11.19 h	5.38 de	40.01 f
1:200		19.71 f	1.30 d	12.67 b	47.39 d	565 e	41 f	11.56 g	5.25 e	41.00 e
1:250		24.13 d	1.53 c	12.50 b	45.76 e	572 d	46 e	13.27 d	5.63 cd	42.22 d
1:300		23.00 e	1.40 d	13.04 b	53.96 c	702 c	51 d	13 e	5.27 e	43.32 c
0	Foliar application	14.12 g	1.06 e	8.47 c	44.21 f	359 f	28.5 g	12.22 f	5.33 de	40.13 f
1:200		32.30 b	2.17 b	13.00 b	53.88 c	700 c	58 c	15.5 c	5.90 bc	42.17 d
1:250		34.80 a	2.70 a	15.20 a	56.25 b	855 a	65 a	16.35 a	6.50 a	45.34 b
1:300		30.08 c	2.63 a	12.50 b	58.56 a	732 b	60 b	16.03 b	6.00 b	46.23 a

A same letter in the column indicates that there is no significant difference ($p<0.05$).

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