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EFFECT OF SOME AGRICULTURAL TREATMENTS ON JEW'S MALLOW SEED PRODUCTION

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ABSTRACT

Two field trials were conducted at Kaha Farm of Horticultural Research, Kaluebia Governorate during the two successive summer seasons of 2001 and 2002 to study the effect of cutting frequency; i.e. without cutting, one cut and two cuts and active dry yeast i.e. 0, 0.1, 0.2 and 0.3%, as well as their interaction on growth parameters, seed yield and its components, in addition to seed quality of Jew's mallow cv. Balady. Obtained results could be summarized as follows :

1- Cutting frequency caused significant increase in number of branches per plant and significant reduction in plant height. The cutting once was the most effective treatment in increasing seed yield components traits expressed as number and weight of pods, number of seed per pod, seed yield per plant and seed yield per fed.; as well as seed index (weight of 1000 seed). On the other hand, these treatments had no significant effect on germination percentage and rate.
2- Spraying Jew's mallow plants with the solution of yeast enhanced number of leaves, leaf area, fresh or dry weight per plant as well as plant height, number of branches, seed yield and its components and seed index (weight of 1000 seed) while, the germination percentage and germination rate were not affected by the these treatments. The most favorable treatment in this respect was yeast at 0.3%.
3- The interaction between cutting frequency and foliar spray with yeast exhibited significant effect on all studied characters, except seed quality expressed as seed index, germination percentage and rate, where this trait was insignificantly affected by this interaction in both seasons.

Generally, it may be concluded that the interaction between cutting plants once with spraying 0.3% yeast was found to be the best treatment for the production of highest dry seed yield, such treatment could be recommended.

INTRODUCTION

Jew's mallow (*Corchorus olitorius*, L) an annual hot-season plant, is popular as green, leafy vegetable fresh or dried. It is a rich source of vitamin A content, moreover phosphorus and calcium. On the other hand, Jew's mallow mucilage have acidic polysaccharides with high quantities of ash (EL-Mahdy and El-Sebaiy, 1984).

The application of cutting frequency and active dry yeast, nowadays seems to be among the pathway for increasing plants productivity and improving seed yield and quality.

Concerning the effect of cutting on leafy vegetable crops, it was noticed that plants responded positively to cutting frequency. Many investigators pointed out that number of branches, number of seed per pod, seed index, seed yield and germination percentage were significantly increased by the cutting frequency up to two cuts (Singh and Gill 1983; Jehangir *et al.*1994; Anisa *et al.*, 1997 working on spinach; El-Assiouty and

Amer, 1997 on Jew's mallow as well as Amer and EL-Assiouty, 2003 on rocket . On the other hand, EL-Lithy *et al.* (1998) illustrated that no significant difference was noticed between cutting and without cutting of the spinach plants for seed index, seed yield and germination percentage.

The various positive effects of applying active dry yeast as a newly used biofertilize were attributed to its unique properties as its contains different nutrients, higher percentage of proteins, larger amount of vitamin B and the natural plant growth hormone, namely cytokinin, in addition, application of active dry yeast was very effective in releasing CO_2 which reflected on improving net photosynthesis (Ahmed, 1998).

The effect of active dry yeast on improving growth was obtained by Fathy and Farid (1996), Amer (2004) on common bean; Hewedy *et al.* (1996 a) on eggplant; Abdel-Aziz (1997), EL-Ghamriny *et al.* (1999); Fathy *et al.* (2000) on tomato and Tartoura, 2001 on pea. They showed that number of leaves, leaf area, fresh and dry weight per plant were enhanced by using yeast.

As for the effect active yeast on plant height and number of branches, Ahmed (1998) on marjoram, Shadia, *et al.* (1998) on Roselle and Eid (2001) on coriander reported that active dry yeast gave a significant increase in these characters.

Seed yield and its components was found to be affected by yeast treatments. Fathy and Farid (1996) indicated that number and weight of dry pods per plant as well as number and weight of dry seeds per plant were improved by using yeast. Similar results were obtained by Hewedy *et al* (1996 a) on eggplant and Amer (2004) on bean.

Seed index (weight of 1000 seeds) of eggplant responded significantly to foliar spray with the yeast, while the germination testes, i.e. percentage and rate were not affected by that treatment (Hewedy *et al,* 1996 a). The same trend was obtained by Amer (2004) on bean.

The objective of the present work was to study the effect of cutting frequency, foliar spray with active dry yeast and its interaction on growth, seed yield and its components as well as seed quality of Jew's mallow.

MATERIALS AND METHODS

Two field experiments were conducted at Vegetable Research Farm of Horticultural Research Insitute, Kaha, Kalyobia Governorate during two successive seasons, viz; 2001 and 2002 to study the effect of cutting frequency and applying active dry yeast on growth, seed yield and its quality of Jew's mallow plants. The soil was clay loam with pH value of 7.8. Each experiment included 12 treatments which were the combinations of Three treatments of cutting and four treatments of spraying with active dry yeast. A split-plot design with four replications was used, cutting treatments occupied the main plots and yeast treatments were allocated at random in sub plots.

The cutting treatments were :

1-Control (C_0) : without cutting. 2- One cut (C_1). 3- Two cuts (C_2).

The yeast treatments were :

1-Contro (Y_0) spraying with distilled water 2- Yeast at 0.1% (Y_1)

3-Yeast at 0.2% (Y_2) 4- Yeast at 0.3% (Y_3)

Active dry yeast (ADY) solutions were carefully prepared before spraying according to method described by (Ahmed, 1998).

Seed of Jew's mallow (*Corchorus olitorius*, L.) cv. Balady were sown on May 29th and June 2nd during 2001 and 2002 respectively in hills 10 cm apart on one side of ridge. The plot area was (10.8 m^2) consisted of four ridges (one ridge for vegetative growth and 3 ridges for the rest of characteristics) each one of 4.5 meters length and 60 cm width .

The plants were cutting twice, 1st cut after 50 days from sowing, whereas 2nd cut after 28 days from 1st cut. Foliar spray with Yeast treatments were done four time at 3, 5 weeks from sowing and 10 days after the first and the second cut. The normal practices of Jew's mallow production were followed.

At the fresh stage (50 days from sowing), 5 plants were chosen at random from each plot where the following records were obtained for spraying with yeast treatments only :

1- Number of leaves per plant.
2- Leaf area (cm^2).
3- Fresh weight per plant.
4- Dry weight per plant.

At the seed harvest stage data were recorded :

1- Plant height (cm).
2- Number of branches per plant.
3- Number of dry pod per plant.
4- Weight of dry pod per plant (g.).
5- Number of seed per pod.
6- Weight of seed per plant (g.).
7- Total seed yield per fed. (kg.).
8- Weight of 1000 seed (seed index) in (gm).
9- Germination percentage : According to the international Rules of (ISTA) 1993.
10- Germination speed (days) was calculated according to Edmond and Drapla (1958).

All obtained data were statistically analysed according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

*** Vegetative growth characteristics :**

Effect of active dry yeast :

Data presented in Table (1) exhibited significant increase in number of leaves/plant, leaf area, fresh and dry weight per plant with increasing yeast concentration. The highest response in all tested growth parameters adepted were attined with the highest rate of yeast (0.3%) in both seasons. These results are coincided with those reported by Fathy & Farid (1996), Amer (2004) on common bean, Hewedy *et al.* (1996 a) on eggplant, EL-Ghamriny *et al.* (1999), Fathy *et al.* (2000) on tomato and Tartoura (2001) on peas.

Table (1) : Effect of foliar spray with active dry yeast on vegetative growth of Jew's mallow plants in 2001 and 2002 seasons .

Active dry yeast concentration %	season							
	2001				2002			
	No. of leaves/ plant	Leaf area (cm^2)	Fresh weight/ plant (g)	Dry weight/ plant (g)	No. of leaves/ plant	Leaf area (cm^2)	Fresh weight/ plant (g)	Dry weight/ plant (g)
0.0	29.5	78.2	52.8	8.8	27.7	77.9	50.2	8.7
0.1	30.8	101.6	68.4	11.4	28.9	98.7	65.0	11.3
0.2	33.2	119.6	70.3	11.7	31.5	115.5	67.5	11.7
0.3	35.4	124.8	74.0	12.3	33.9	121.4	73.0	12.6
L.S.D. (5%)	0.09	2.2	1.4	0.07	0.08	1.1	1.3	0.05

The enhancing effect of yeast as foliar spray on vegetative growth, may be due to being yeast as natural source of cytokinins might enhance cell division and cell enlargement so far increasing the leaf surface area as well as enhancing the accumulation of soluble metabolites as mentioned about the rote of cytokinins. Also, yeast is natural source of many growth substances (thiamine, riboflavin, niacin, pyridoxine Hel, pantothenale, bioten, cholin, folic and vit 12) and the most nutrional elements (Na, Ca, Fe, Mg, K, P, S, Zn, Si) as well as organic compounds protein, carbohydrates, nucleic acids and lipids (Amer, 2004).

*** Plant height and number of branches :**

1- Effect of cutting frequency :

Plant height and number of branches per plant at seed harvesting stage were influenced significantly by cutting frequency during the two experimental seasons (Table 2). Cutting frequency resulted in reducing plant height, where as such treatment gave the opposite result with number of branches, which was significantly increased by the cutting frequency. Similar results were obtained by Anisa *et al.* (1997), EL-Assiouty & Amer (1997) and Amer & EL-Assiouty (2003) found that cutting frequency gave shorter plants and higher number of branches.

2- Effect of active dry yeast :

It is obvious from Table (2) that plant height and number of branches per plant at seed harvesting time were significantly increased with increasing yeast concentration. The highest value was obtained by spraying Jew's mallow plants with active dry yeast at the high concentration (0.3%). Similar trend of response were obtained by Ahmed (1998), Shadia et al. (1998) and Eid (2001).

3- Effect of interaction between treatments :

concerning the effect of interaction between cutting frequency and yeast. Data of Table (2) show clearly that cutting plants twice combined with foliar spray with distilled water (control) was found to the most effective treatment as such treatment produced the shorter plant while cutting plants twice

combined with foliar spray with active dry yeast at the high level (0.3%) in both seasons.

Table (2) : Effect of cutting Frequency, yeast and their interaction on plant height and number of branches of Jew's mallow plants in 2001 and 2002 seasons.

Treatments Cutting Yeast		season			
		2001		2002	
		Plant height (cm)	No. of branches/plant	Plant height (cm)	No. of branches/plant
C_0		199.8	3.6	207.4	4.4
C_1		129.0	5.0	126.9	5.4
C_2		93.9	6.0	93.3	6.0
L.S.D. (5%)		2.3	0.03	3.3	0.02
	Y_0	124.0	3.8	123.0	4.3
	Y_1	139.5	4.3	145.0	4.8
	Y_2	147.7	5.3	149.7	5.5
	Y_3	152.3	6.0	151.1	6.3
L.S.D. (5%)		1.2	0.02	1.9	0.02
C_0	Y_0	160.0	3.0	162.5	3.5
	Y_1	202.0	3.5	217.5	4.0
	Y_2	215.0	4.0	223.0	5.0
	Y_3	222.0	4.0	226.5	5.0
C_1	Y_0	124.0	4.0	116.5	4.5
	Y_1	126.0	4.5	128.0	5.0
	Y_2	131.0	5.5	131.0	5.5
	Y_3	135.0	6.0	132.0	6.5
C_2	Y_0	88.0	4.5	90.0	5.0
	Y_1	90.5	5.0	92.0	5.5
	Y_2	97.0	6.5	95.0	6.0
	Y_3	100.0	8.0	96.0	7.5
L.S.D. (5%)		0.8	0.08	0.6	0.03

C = cutting Y = yeast

*** Seed yield and its components :**

1- Effect of number of cuts :

From Table (3), it is obvious that cutting frequency affected number and wight of dry pods per plant, number of seed per pod, weight of seed per plant and seed yield per feddan producing the highest values by using one cut compared with the other treatments. These values were significant for all characters in both seasons. The results were similar to those obtained by Singh and Gill (1983); Jenhangir *et al.* (1994); EL-Assiouty and Amer (1997) as well as Amer and EL-Assiouty (2003) on leafy vegetables. They noticed that cut once gave the highest seed yield and more frequent cutting reduce this character. On the other hand, Verma *et al.* (1992) found that leaf cutting of beet spinach caused a dramatic reduced in seed yield with each successive cutting.

Table (3) : Effect of cutting Frequency, yeast and their interaction on seed yield and its components of Jew's mallow plants in 2001 and 2002 seasons.

Treatments		Season									
		2001					2002				
Cutting	Yeast	No. of dry pods/plant	Wt. of dry pods/plant (g)	No. of seed/pod	Wt. of seed/plant (g)	Seed yield /fed (kg)	No. of dry pods/plant	Wt. of dry pods/plant (g)	No. of seed/pod	Wt. of seed/plant (g)	Seed yield /fed (kg)
C_0		121.0	14.3	185.4	8.7	277.0	136.0	15.8	188.9	9.2	286.3
C_1		150.0	17.2	194.1	10.7	343.1	165.5	17.6	212.2	10.5	312.8
C_2		118.9	13.8	176.8	7.7	247.2	132.6	13.8	182.0	8.3	263.5
L.S.D. (5%)		1.7	0.8	1.9	0.4	1.3	2.0	0.3	1.6	0.3	3.1
	Y_0	90.2	11.0	158.5	6.5	209.1	94.0	11.0	173.1	6.3	202.7
	Y_1	103.3	12.1	182.8	7.8	249.7	117.0	13.5	182.0	8.1	236.3
	Y_2	144.3	16.7	197.6	10.3	328.5	165.7	17.4	206.9	10.4	314.3
	Y_3	182.0	19.8	202.6	11.5	369.1	201.5	21.1	216.3	12.3	396.7
L.S.D. (5%)		1.3	0.9	1.0	0.5	2.2	2.9	0.7	1.1	0.5	6.0
C_0	Y_0	94.0	11.3	153.1	6.8	217.6	92.0	10.7	173.6	5.9	188.8
	Y_1	107.0	12.0	171.9	7.5	240.8	121.0	14.1	183.9	8.4	228.8
	Y_2	126.0	15.1	207.2	9.0	288.0	147.5	17.1	190.9	10.3	329.6
	Y_3	157.0	18.8	209.2	11.3	361.6	183.5	21.3	207.2	11.7	397.8
C_1	Y_0	97.0	12.1	152.4	7.0	224.0	103.0	12.3	196.2	7.1	227.2
	Y_1	110.0	13.2	200.4	9.2	294.0	126.0	15.1	198.5	9.1	273.0
	Y_2	181.0	20.7	208.0	13.1	419.2	193.5	19.4	226.6	11.6	324.8
	Y_3	212.0	22.7	215.3	13.6	435.4	237.5	23.7	228.0	14.2	426.0
C_2	Y_0	79.7	9.6	170.1	5.8	185.6	87.0	10.0	149.4	6.0	192.0
	Y_1	93.0	11.2	176.2	6.7	214.4	104.0	11.2	163.5	6.7	207.0
	Y_2	126.0	14.4	177.5	8.7	278.4	156.0	15.6	203.1	9.4	288.4
	Y_3	177.0	17.9	183.4	9.7	310.4	183.5	18.3	213.6	11.0	366.4
L.S.D. (5%)		2.4	1.5	2.7	0.9	3.1	4.4	1.0	2.8	0.8	4.7

C = cutting Y = yeast

It be concluded that the highest seed yield per feddan which produced from cutting once may be attributed to its higher number of branches and number of seed per pod as well as the heaviest weight of seed (seed index).

2- Effect of active dry yeast :

Data of Table (3), reveal that, all concentrations of yeast affected number and weight of dry pods, number of seed per pod, weight of seed per plant and seed yield per feddan. Spraying with yeast at the high level (0.3%) gave the highest value in this regard compared with other treatments. Differences between yeast treatments were significant for all studied characters in both seasons. In this connection, Fathy and farid 1996, Hewedy *et al.* (1996) and Amer (2004) pointed out that spray plants with yeast resulted in increasing seed yield. These results could be attributed to yeast as natural sources of cytokinins which enhance the accumulation of soluble metabolites (Muller and Leopold, 1966) or that yeast is natural source of many growth substance, in addition the most nutritional elements as well as organic compounds (Nagodawithana, 1991). Moreover, it improved vegetative growth as shown in Table (1) which in tern reflected on seed yield.

3- Effect of interaction between treatments :

The effect of interaction between cutting frequency and yeast on number and weight of dry pod per plant, number of seed per pod, weight of seed per plant and seed yield per feddan are shown in Table (3). It is evident the highest number of dry pod and seed per pod, the heaviest dry pod and seed weights per plant as well as the maximum seed yield were obtained from using one cut with 0.3% yeast treatment in both season of study. On the other hand the lowest value was obtained by without cutting with zero yeast.

*** Seed quality :**

1- Effect of number of cuts :

Seed index (weight of 1000 seed) of Jew's mallow response significantly to cutting frequency as shown in (Table :4) producing the highest values by using on cut compared with the other treatments in both seasons. Similar results were obtained by Anisa *et al.* 1997 EL-Assiouty and Amer (1997) as well as Amer and EL-Assiouty (2003). At the same table seed germination and germination rate were not significant affected by number of cuts in both season. In this respect, Anisa *et al.*(1997) and EL-Assiouty and Amer (1997) pointed out the same results.

2- Effect of active dry yeast :

The results reported in Table (4) indicate clearly that seed index (weight of 1000 seed) was significantly affected by different concentrations of yeast. These results were true in both seasons. The heaviest weight of seed was obtained by spraying plants with the high concentration of yeast (0.3%). In the same table pointed out that yeast treatments had no significant effect on both germination percentage and germination rate during both seasons of study. These finding agree with Hewedy *et al.* (1996 b) on eggplant and Amer (2004) on bean.

Table (4) : Effect of cutting Frequency, yeast and their interaction on seed quality of Jew's mallow plants in 2001 and 2002 seasons.

Treatments		Season					
		2001			2002		
Cutting	Yeast	Seed index (g)	Germination %	Germination speed (days)	Seed index (g)	Germination %	Germination speed (days)
C_0		1.73	90.9	3.04	1.70	93.0	3.07
C_1		1.80	93.1	3.05	1.78	93.5	3.06
C_2		1.56	93.6	3.08	1.55	94.3	3.05
L.S.D. (5%)		0.02	N.S.	N.S.	0.02	N.S.	N.S.
	Y_0	1.54	91.8	3.07	1.55	93.0	3.03
	Y_1	1.64	92.3	3.05	1.60	93.2	3.07
	Y_2	1.76	92.7	3.07	1.68	94.2	3.07
	Y_3	1.83	93.2	3.03	1.88	94.7	3.07
L.S.D. (5%)		0.02	N.S.	N.S.	0.03	N.S.	N.S.
C_0	Y_0	1.48	90.0	3.06	1.43	92.5	3.05
	Y_1	1.66	91.0	3.03	1.58	93.0	3.06
	Y_2	1.87	91.0	3.02	1.79	94.0	3.09
	Y_3	1.89	91.5	3.03	2.01	94.5	3.09
C_1	Y_0	1.69	92.5	3.05	1.76	93.0	3.00
	Y_1	1.78	93.0	3.06	1.76	93.0	3.09
	Y_2	1.84	93.0	3.09	1.79	93.5	3.08
	Y_3	1.87	94.0	3.00	1.80	94.5	3.08
C_2	Y_0	1.45	93.0	3.09	1.48	93.5	3.05
	Y_1	1.47	93.5	3.07	1.49	93.5	3.07
	Y_2	1.58	94.0	3.09	1.49	95.0	3.05
	Y_3	1.72	94.0	3.06	1.75	95.0	3.04
L.S.D. (5%)		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

C = cutting Y = yeast

3- Effect of interaction between treatments :

Data tabulated in Table (4) illustrated that, seed quality i.e. seed index, seed germination and germination rate were insignificantly affected by interaction between number of cuts and spraying with yeast in both seasons.

As a general conclusion, it could be suggest that vegetative growth, seed yield and its components as well as seed quality varied greatly according to cutting frequency, foliar spray with yeast and their interaction. Whereas, the highest seed yield was obtained by cutting once with spraying with yeast at 0.3%. This treatment seemed to be the most favorable and desirable treatment, which may be recommended under similar conditions.

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تأثير بعض المعاملات الزراعية على إنتاج تقاوى الملوخيه

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أجريت تجربتان حقليتان بمزرعة بحوث الخضر بقها محافظة القليوبيه وذلك خلال موسمى الزراعة الصيفى ٢٠٠١،٢٠٠٢ أستهدفت دراسة تأثير عدد مرات الحش .. وهى (بدون حش – حشة واحدة – حشتين) والرش بمحلول الخميرة بتركيزات (صفر ، ٠,١ ، ٠,٢ ، ٠,٣٪) والتفاعل بينهما على صفات النمو والمحصول البذرى وجودته لنباتات الملوخيه صنف بلدى .

ويمكن إيجاز النتائج فيما يلى :

أولاً : تأثير عدد مرات الحش

أدت زيادة عدد مرات الحش إلى زيادة معنويه فى عدد أفرع النبات ونقص معنوى فى أرتفاع النبات . وكان الحش مرة واحدة أكثر فاعليه فى زيادة صفات مكونات محصول البذور والمتمثل فى عدد القرون – وزن القرون – عدد البذور فى القرن – وزن بذور النبات – محصول البذور للفدان وكذا زيادة وزن الـ ١٠٠٠ بذرة . ولم يكن لهذه المعاملات أى تأثير معنوى على نسبة وسرعة الإنبات .

ثانياً : تأثير الرش بالخميرة

شجع الرش بالخميرة النمو الخضرى معبراً عنه بعدد الأوراق – مساحة الورقة – الوزن الطازج والجاف للنبات وكذلك إرتفاع النبات وعدد الأفرع . كما أدى الرش بالخميرة أيضاً إلى زيادة معنوية فى محصول البذور ومكوناته وكذا وزن الـ ١٠٠٠ بذرة ولم يكن له أى تأثير معنوى على نسبة وسرعة الإنبات . وكان الرش بتركيز ٠,٣٪ أكثر فاعليه فى الحصول على أفضل النتائج للصفات المدروسة .

ثالثاً : تأثير التفاعل بين تكرار الحش والرش بالخميرة

تأثرت جميع الصفات المدروسة معنوياً نتيجة التفاعل بين المعاملات المستخدمة بإستثناء جودة البذور والمعبر عنها بـ وزن الـ ١٠٠٠ بذرة – نسبة وسرعة الإنبات حيث لم تتأثر بذلك .

وللحصول على أعلى محصول بذرى ينصح بحش نباتات الملوخيه مرة واحدة مع الرش بمحلول الخميرة بتركيز ٠,٣٪