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EFFECT OF LEACHING TIME AND GA3 SOLUTIONS ON GERMINATION, SEED EMERGENCE AND SEEDLING LENGTH OF FENNEL AND PARSELY PLANTS (FAM. UMBELLIFERAE).

M.R. KHATER[2], ANISA I. ISMAIL[1] AND S.M. MOHAMED[2]

1 Vegetable Seed Technology Research sectrion, Hort Res. Inst., Agric. Res. Center.
2 Medicinal and Aromatic Plants Research section,Hort Res.Inst., Agric. Res. Center

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Abstract

The present investigation was conducted in the Laboratory of Vegetable Seed Technology Research Section, Dokki, during 1995 and 1996 seasons on fennel seed (*Foeniculum vulgare* var. Doice) and parsley (*Petroslinum crispum* Mill). The experiment was designed in split plots, the treatments in the main plots were (control, leaching, GA_3 100 ppm [T1] while the treatments in the sub plots were,control and soaking in GA3 for 6hrs, 12hrs, and 24hrs. The results obtained showed an increase in germination percentage and seedlings length while the applied treatments accelerated seed emergence. The best result for germination was by using 24 hrs soaking time and 200 ppm GA_3 for both fennel and parsley seeds.

INTRODUCTION

Fennel (*Foeniculum vulgare*, var. Dolce) is one of the most important plants, belongs to Family Umbelliferae. It is a prennial plant 60-150 height, the stems are erect, solid, the leaves are finely pinnate, bluish green, flowers yellow in large umbels

The lower parts of the leaves as well as the fruits are used as flavoring agent in culinary preparations, breads, pastery, confectionary and as ingredients of powder with liquorice. The volatile oil produced from fennel seeds is used in medicinal preparation, as carminative or as flavoring agent (Chiej 1984).

Parsely, (*Petroslinum crispum* Mill.), is a herbacious plant belonging to Family Umbelliferae, a fragile plant with white tap root and branched striated, cylindrical stem 20 cm long. The leaves are pinnate with oval lobes. The basal leaves being more narower than the apical and with a dental or incised margin.

The flowers are grouped in compound umbels of ray florets, the calyx entire and white corolla is 5-petalled with the apex of each petal curved inward the leaves are exentensively used for their aromatic quality in cooking. Parsley juice is an effective mosquits reprellent Chiej (1977). Zakarodonets (1963) mentioned that GA_3 in concentration 200ppm caused an increase in percentage of germination and reduced the time of seedling emergence. Radwan et al (1981) reported that GA_3 treatments caused increase in pepper germination percentage. Also, mostafa et al (1982) found that leached pepper seed for 24, 46, or 72 hrs. followed by drying for 24 hrs. at 25° caused an increase in the germinaion percentage by increasing the leached period.

The aim of this work was to study the effect of GA_3 and leaching time treatments on seed germination, seed emergrnce, and seedling length in fennel and parsley.

MATERIALS AND METHODS

The study was conducted in the laboratory of Vegetable Seed Technology Research Section during 1995 and 1996 seasons on fennel seed (*Foeniculum vulgare* var. Dulce) and parsley seed (*Petroslinum crispum*).

The experiment was designed in split plot design with four replicates. The main plots were control, 50, 100, 200 ppm GA3 and soaking time for 6hrs., 12 hrs. 24hrs in addition to the control. A number of 100 seeds from each treatment were planted in a germinator oven with relative humidity 95% at 25°C. Germination percentage, germination emergency rate and seed length were recorded and calculated according to the International Rules for Seed Testing Association (1966). The obtained data were statistically analysed according to snedicor (1967).

Leaching was carried out by putting the seeds in chease cloth bags and exposed to running tap water for the designed periods. When the leaching time was over for each treatment, the leached seeds were dried and sown in an incubator adjusted to 25°C. The aim of this work was to study the effect of GA3 levels and leaching time on germination percentage, seed emergence and seedling lengths of some umbelliferae plants.

RESULTS AND DISCUSSION

1. Effect of GA_3 levels and leaching time on germination percent-

age of fennel seeds:

Data listed in Table 1 show that there was a significant increase in the percentage of seed germination by increasing the seed soaking time (hours) up to 24 hours. These results may be due to the effect of soaking to stimulate embryo for cell division and elongation. Moreover, soaking may provide vital conditions to enzymes to increase starch hydrolysis. Such effect leads to produce the monosaccharide glucose which is necessary for many many metabolic process such as cell elongation and cell division.

Table 1. Effect of GA_3 levels and leaching time treatments on germination percentage of fennel seeds.

Treatment Time/hours	germination percentages									
	1995					1996				
	Soaking time					Soaking time				
	Control	6 hrs	12 hrs	24 hrs.	Mean	Control	6 hrs	12 hrs	24 hrs.	Mean
Control	80.6	82.3	88	89.3	85.1	77.0	81.3	83.3	85.0	81.7
LEaching	80.6	86	89	90	86.4	77.0	82.7	86.0	87.0	83.2
GA3100 ppm	80.6	84	88	90	85.7	77.0	80.7	85.7	89.3	88.2
GA3 200 ppm	80.6	86.6	88	90.6	86.4	77.0	82.7	87.3	90.0	84.3
Mean	80.6	84.7	88.2	89.9		77.0	81.9	85.6	87.8	

L.S.D. at 5%

Treatment	0.51	0.86
Times	1.34	0.77
Treatments x time	1.75	1.54

Data presented in Table (1) show that there was a significant increase in the percentage of seed germination by the increase in GA_3 levels. These results may be due to the effect of GA_3 treatments to increase amylase enzyme activity which resulted to increase the monosaccaharide needed for the metabolic process required for the germination, these results are in agreement with those obtained by Singh (1977) on okra, Doijode and Rom (1977), Deka and Das (1978) on radish, Ahmed et al (1990) on tomato, Hussien and Ismail (1992) on okra.

2. Effect of GA_3 levels and leaching time treatments on seed emergence of fennel seeds:

Data presented in Table 2 shows that there was a significant decrease in seed emergence due to the increased time of soaking seeds up to 24 hrs 100 ppm and 200 ppm. These ressults may be due to suitable conditions for cell division.

Data listed in Table (2) show that there was insignificant differences due to different levels of GA_3. These results may be due to that there was a hormonal balance in the seeds so that they did not need any more of GA_3 for seed emergence.

Table 2. Effect of GA_3 levels and leaching time on seed emergence (days) of fennel seed.

Treatment Time/hours	Seed emergence									
	1995					1996				
	Soaking time					Soaking time				
	Control	6 hrs	12 hrs	24 hrs.	Mean	Control	6 hrs	12 hrs	24 hrs.	Mean
Control	5.5	4.3	4.1	3.9	4.5	5.7	4.5	4.2	4.0	4.6
Leaching	5.5	4.2	4.1	3.9	4.4	5.7	4.4	4.2	3.9	4.5
GA_3 100 ppm	5.5	4.2	4.1	3.9	4.4	5.7	4.3	4.1	4.0	4.5
GA_3 200 ppm	5.5	4.0	3.9	3.9	4.3	5.7	4.1	4.0	3.7	4.4
Mean	5.5	4.2	4.1	3.9		5.7	5.2	4.1	3.9	

L.S.D. at 5%

Treatment	0.08	0.21
Times	0.10	0.71
Treatments x time	0.20	0.34

3- Effect of GA_3 levels and leaching time treatments on seedling length of fennel seed:

Data listed in table 3 show that there was a significant increase in seedling length due to soaking seeds in water up to 24hrs. These results may be attributed to the decrease in seed emergence. The results are in agreement with those obtained by Mostafa et al (1982). Regarding the effect of GA_3 on seedling length, the results showed a significant increase on seedling length with the increase of GA_3 levels. The obtained results are in agreement with those obtained by Dowedar and Fahmy (1976) on tomato; Cantliffe and Watkins (1983); and Roger's and Pike (1989) on pepper.The interaction between soaking seeds and GA_3 levels was significant. The best result was by using soaking seeds 24 hrs. and 200 ppm GA_3.

Table 3. Effect of GA_3 levels and leaching time treatments on seedling length (cm) of fennel seed.

Treatment Time/hours	Seedling lengh (cm)									
	1995					1996				
	Soaking time					Soaking time				
	Control	6 hrs	12 hrs	24 hrs.	Mean	Control	6 hrs	12 hrs	24 hrs.	Mean
Control	10.9	12.2	13.8	13.9	12.7	10.4	11.5	13.3	13.7	12.2
Leaching	10.9	12.2	13.9	14.2	12.8	10.4	12.0	13.7	14.0	12.5
GA_3 100 ppm	10.9	12.7	14.1	14.3	13.0	10.4	12.2	13.7	14.2	12.6
GA_3 200 ppm	10.9	12.8	14.2	14.5	13.1	10.4	12.6	14.0	14.3	12.8
Mean	10.9	12.5	14.0	14.2		10.4	12.1	13.7	14.1	
L.S.D. at 5%										
Treatments					0.20					0.15
Times					0.17					0.36
Treatments x time					0.51					0.71

PARSLEY SEED

1. Effect of GA_3 levels and leaching time treatments on germination of parsley seed:

Data listed in Table (4) revealed that there was a significant increase in percentage of seed germination by increase the soaking period up to 24 hrs. These results may be due to the effect of the time of souking to stimulate embryo for cell division and cell elongation. Also, soaking gave suitable conditions for the enzymes to increase starch hydrolysis hence, producing adequate amount of monosccharides in the seeds for cell elongation. Concerning the effect of GA_3 levels on germination perentage, a significant increase can be observed by the increase of GA_3 levels. The obtained results could be attributed to the effect of GA_3 treatment to activate amylase enzyme to increase the rate of starch hydrolysis to monosaccharides necessary for the germination process. These results are in agreement with those obtained by Singh and Sing (1977) on okra, Doijode and Rom (1977); Deka and Das on pea; Kumor and Alka (1978) on radish; and Hussien and Ismail (1992) on okra.

2. Effect of GA_3 levels and leaching time treatments of parsley seed:

Data presented in Table (5) clear that there was a decrease in seed emergence as increasing seed soaking per hours. These results may be due to the effect of soaking time to promote the seed to rapid seed emergence. Also, a decrease could be

Table 4. Effect of GA_3 levels and leaching time on germination percentage of parsley seeds.

Treatment Time/hours	germination percentages									
	1995					1996				
	Soaking time					Soaking time				
	Control	6 hrs	12 hrs	24 hrs.	Mean	Control	6 hrs	12 hrs	24 hrs.	Mean
Control	54.3	62.0	66.0	71.3	63.4	52.0	56.7	59.3	62.7	57.7
Leaching	54.3	63.0	72.0	73.3	65.6	52.0	57.3	60.7	64.7	58.7
GA_3 100 ppm	54.3	62.6	68.6	72.0	64.4	52.0	57.7	59.3	65.3	58.6
GA_3 200 ppm	54.3	64.6	70.6	74.0	65.9	52.0	58.0	61.3	66.7	59.5
Mean	54.3	63.1	69.3	72.6		52.0	57.3	60.0	64.8	
L.S.D. at 5%										
Treatment					1.24					0.89
Times					0.99					0.98
Treatments x time					1.98					1.95

Table 5. Effect of GA3 levels and leaching time on seed emergence (days) of parsley seed.

Treatment Time/hours	Seed emergence									
	1995					1996				
	Soaking time					Soaking time				
	Control	6 hrs	12 hrs	24 hrs.	Mean	Control	6 hrs	12 hrs	24 hrs.	Mean
Control	13.3	11.9	11.7	11.4	12.1	13.7	12.1	11.9	11.7	12.3
Leaching	13.3	11.7	11.3	11.1	11.9	13.7	11.9	11.8	11.2	12.1
GA_3 100 ppm	13.3	11.5	11.2	10.9	11.7	13.7	11.9	11.7	10.9	12.0
GA_3 200 ppm	13.3	11.5	11.2	10.7	11.7	13.7	11.5	11.6	10.8	12.0
Mean	13.3	11.7	11.4	11.8		13.7	11.9	11.8	11.2	
L.S.D. at 5%										
Treatment					0.24					0.19
Times					0.32					0.16
Treatments x time					0.65					0.32

observed in seed emergence by the increase of GA_3 levels. The obtained results are in agreement with those obtained by Mostafa et al (1982).

3. Effect of GA_3 levels and leaching time treatments on seedling length of parsley seed:

Data in Table (6) show that there was a significant increase in seedling length by increasing GA_3 levels. Such results may be attributed to the effect of GA_3 to increase cell division and cell elongation. With regard to the effect of soaking periods data in Table 6 clear that there was an increase in seedling length as the time of soaking was increased. Such obtained results could be attributed to the effect of soaking to reduce seedling emergency. On the other hand, the interaction between GA_3 concentration and time on seedling length is significant. The best result was obtained by using 200 ppm and soaking seeds for 24 hrs.

Table 6. Effect of GA3 levels and leaching time on seedling length (cm) of parsley seed.

Treatment Time/hours	Seedling lenth (cm) of parsley									
	1995					1996				
	Soaking time					Soaking time				
	Control	6 hrs	12 hrs	24 hrs.	Mean	Control	6 hrs	12 hrs	24 hrs.	Mean
Control	5.3	5.7	5.8	6.3	5.8	5.2	5.4	5.5	5.6	5.4
Leaching	5.3	6.6	7.2	7.6	6.7	5.2	5.5	5.2	5.4	5.5
$GA_3$100 ppm	5.3	6.7	7.4	7.7	6.8	5.2	5.6	5.7	5.9	5.6
GA_3 200 ppm	5.3	6.8	7.6	7.7	6.8	5.2	5.6	5.9	6.3	5.7
Mean	5.3	6.5	6.3	7.3		5.2	5.5	5.6	5.9	
L.S.D. at 5%										
Treatments					0.13					0.06
Times					0.17					0.14
Treatments x time					0.34					0.20

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تأثير المعاملة بالجبرللين والماء الجارى على نسبة وسرعة إنبات البذور وطول البادرات فى نباتى الشمر والبقدونس (الفصيلة الخيمية)

مرتضى خاطر١ ، أنيسة إبراهيم إسماعيل٢ ، سعيد محمود محمد١

١ معهد بحوث البساتين – قسم النباتات الطبية والعطرية.

٢ معهد بحوث البساتين – قسم التكنولوجيا الاكفار.

اجرى هذا البحث فى معمل قسم بحوث تكنولوجيا تقاوى الخضر على نباتى الشمر الحلو والبقدونس خلال موسمى الزرعة ١٩٩٥ – ١٩٩٦. صممت التجربة بطريقة القطع المنشقة تمثل القطاعات الرئيسية (الكونترول ، النقع فى الماء الجارى، ومحلول الجبرلين بتركيز ١٠٠ ، ٢٠٠ جزء فى المليون) بينما القطع المنشقة تمثل (كونترول ، النقع فى الماء ٦ ساعات، ٢٤) أظهرت النتائج أن هناك زيادة فى نسبة الأنبات وطول البادرات كما أدت المعاملات إلى الاسراع فى ظهور البادرات.

أفضل نتائج الإنبات كانت بنقع البذور لمدة ٢٤ ساعة واستخدام محلول الجبرلين بتركيز ٢٠٠ جزء فى المليون فى كل من بذور الشمر والبقدونس.