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ASSESSMENT OF SEVEN DILL CULTIVARS GROWN IN POTS IN WOOD HOUSE

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ABSTRACT : Seven genotypes of dill (*Anethum graveolens* L.) were evaluated namely Erbil, cv. Gribovsky, cv. superdukat, cv. Kustovoy, cv. ambrozja, cv. Agrodowy (common cultivar grown in Poland) and cv. Common (the Local cultivar of dill in Iraq) using completely randomized Block Design in pots during winter season 2017-2018 at lath house of department of horticulture and land scape to estimate variability and seed yield and its contributing traits. Results revealed that best genotypes was Ambrozja, which achieved highest braches per plant of 133.33 branch plant^{-1}, seed per umbellate of 72.44 seed umbellate^{-1} and seed yield per plant of 4.42 g plant^{-1}. The estimated PCV, GCV were highest for seed per umbellate of 69.708 and 69.88, and for umbel per plant of 63.708 and 61.204, respectively. For broad sense heritability, was biggest for seed per umbellate of 99.5%, and for umbel per plant of 99.6%.

Key words : Dill, plant, pot, wood house.

INTRODUCTION

Dill (*Anethum graveolens* L.) is an annual and sometimes biennial herb of the Apiaceae family, native to South-West Asia or South-East Europe. It has been cultivated sinceancient times (Bailer *et al*, 2001) as a vegetable, aromatic, carminative and antispasmodic as well as an inhibitor of sprouting in stored potatoes (Score *et al*, 1997). Dill is one of the most popular seasonings both in our country and in the world. Fresh herb is very instable and after harvesting unsuitable for storage. Fr¹szczak (2009) compared eight cultivars of dill *viz*., 'Amat', 'Ambrozja', 'Herkules', 'Krezus', 'Kronos', 'Lukullus', 'Skaner' and 'Szmaragd' in container, who found that 'Ambrozja' cultivar was characterized by the highest growth dynamics and value of LAI index. The performed experiments showed that 'Ambrozja' cultivar is the most suitable one for cultivation in container. Said-Alahl and Omar evaluated eight cultivars of dill *viz*., cv. Common, cv. Local, cv. Compatto, cv. Bouquet, cv. Elephant cv. Vierling, cv. Tetra and then cv. Dukat depended on essential oil content and chemical composition in Egyptian conditions. The productivity and quality of essential oil depend on cultivar, climate, sowing and harvest dates, environmental stress, and management practices (Kruger and Hammer, 1996; Badoca and Lamartib, 1991; Bowes *et al*, 2004). Lisiewska *et al* (2001) compared three cultivars of dill *viz*., amat, ambrozja and lukullus showed that Amat was the greatest one in content of chlorophylls and volatile oil. Salman and Sachet showed (2013) that local cultivar of dill was superior on Syrian inin number of branches and leaves, Fresh and dry yield per area unit, plant content of chlorophyll, nitrogen, potassium and fibers percentage and volatile oil yield as compared with Syrian cultivar. Singh *et al* (2003) evaluated Thirty four diverse fennel genotypes collected from different parts of India; they found that the genotype IC-279039, JF-252, EC-279042 and EC-386375 were found promising in respect of grower's preference. Nagypure (2013) extracted that among the various cultivars tried, NRCSS AD-1 exhibited maximum plant height at 40, 80 and 120 DAS, number of branches at harvest and days to 50% flowering. However, the early germination was observed in cultivar NRCSS AD-2. Similarly, cultivar NRCSS AD-1 significantly increased yield attributes *viz*. fresh and dry weight of plant (g) at 40, 80 and 120 DAS, number of umbels per plant, number of umbellate per umbel, number of seed per umbel, test weight (g), seed yield q ha^{-1}, straw yield q ha^{-1}, biological yield q ha^{-1} and harvest index in comparison to other cultivar NRCSS AD-2 and Local cultivar. Almehemdi *et al* (2015) assessed four genotypes of fennel; Amego, di Firenze, romanesco and dollap using GCV, PCV and heritability under Iraqi conditions. Consequently, they found that highest GCV and PCV had

registered in umbel weight of 36.00 and 31.17, respectively, in first season while in second was for umbellate per umbel of 52.83 and 53.16. Gautam *et al* (2011) elucidated genetic variability components and association among different traits influenced on seed yield of dill under with sodic soil, who found that inflorescence per plant was most sensitive, low GCV, high heritability and high genetic advance. Estimated of GCV and PCV were fairly high manipulation of variability for oil content, harvest index, seed yield per plant, number of umbels per plant, number of secondary branches per plant. Lower values of GCV and PCV were recorded in number of umbellates per umbel, plant height and days to 50% flowering. Thus, it represented the importance of environment in the expression of the traits in dill (Solanki and Dodiya, 2014). In another trial on one hundred twenty germplasms of dill (*Anethum graveolens* L., & A. sowa), it was shown big estimates of PCV along with GCV, broad sense heritability, genetic advance and genetic advance as percentage for plant height up, umbel plant^{-1}, umbellate umbel^{-1}, plant height, primary branches plant^{-1}, test weight, seeds umbel^{-1} and seed yield plant^{-1} (Choudhary *et al*, 2018). Due to their commercial interest, the essential oils from the fruits (seeds) of dill growers are looking for new cash crops. However, in our opinion, such goal may be achieved by introducing new cultivars of dill to cultivate in the first time under conditions of Iraq, therehas been no evaluation of these imported European dill cultivars under Iraq conditions and so clarifying to what extent the different cultivars of dill can superior and through selecting the superior cultivars under Iraq conditions. Therefore, to make this study more representative, some European cultivars were chosen for this study compared with the Local cultivar under Iraq condition. To evaluate these cultivars of dill as potential new cash crops for essential oil production in Iraq based on having been developed for essential oil production and their productivity in Iraq and to assess the content and quality performance of dill cultivars oils and also to determine the chemotype of these cultivars cultivated in Iraq.

MATERIALS AND METHODS

The experimental was carried out lath house at university of Anbar College of Agriculture at winter season 2017, the experimental coticatied plants were grown in pots of 280-cm^3 volume, filled peat substrate for vegetable transplanting production. The seeds of seven cultivars of dill (*Anethum graveolens*) *viz*., cv. Erbil, cv. Gribovsky, cv. superdukat, cv. Kustovoy, cv. ambrozja, cv. Agrodowy (common cultivar grown in Poland) and cv. Common (the Local cultivar of dill in Iraq). The seeds of the seven cultivars were sown on 15th October in pots. The normal agricultural practices normally done for the dill were performed for all cultivars. The plants were harvested on 20th May and the seeds were collected. The experimental layout was a complete randomized block design with three replications. The number of plants grown in pots was identical. The plants were measured at physiological maturity of seeds. In every pot, 3 plants were measured. The harvesting involved hand cutting of plants close to the surface of the substrate. After the harvest, the height of plants from the pot, dry weightbranches per plant, seeds per umbellate, umbellate per umbel, umbel per plant and seeds weight were determined.

Statistical analysis

Some vegetative and yield traits of seven cultivars was analyzed with the analysis of variance (ANOVA) using SPSS program (SAS Institute, NC, USA). The mean values of treatments were compared using L.S.D test at $p \leq 0.05$.

Genotypic coefficient of variation (GCV): genetic variation revealed in a trait was estimated by the formula pointed by Burton (1952).

$$GCV = \left(\frac{\sqrt{vg}}{x} \right) \times 100$$

Where,

vg = Genotypic variance

x = Grand mean of the trait under evaluation.

Phenotypic coefficient of variation (PCV): phenotypic variation revealed in a trait was estimated by the formula pointed by Burton (1952).

$$PCV = \left(\frac{\sqrt{vp}}{x} \right) \times 100$$

Where,

vp = Phenotypic variance

x = Grand mean of the trait under evaluation.

Heritability: Heritability in the broad sense was calculated by the formula pointed by Burton and Devane (1953).

$$H = \left(\frac{\sqrt{vg}}{vp} \right) \times 100$$

Where,

H = Heritability (Broad sense)

vg = Genotypic variance

vp = Phenotypic variance

RESULTS AND DISCUSSION

Vegetative traits

Table 1 shows the plant height, dry weight and branches per plant in seven cultivars of dill. cv. Agrodowy showed significantly higher plant height of 66.42 cm. Common was the highest in dry weight of 3.18 g than the rest of cultivars. Cultivar mushroom had the second higher plant height of 64.17 cm and dry weight of 2.94 g. On the mean time, cv. bushy has the third higher plant height of 63.08 cm, while am. On the other hand, cv. ambrozja, cv. Erbil, cv. super, all had lower plant height of 38.89, dry weight of 1.73 g and branches of 38.17 branches per plant, respectively. Ambrozja possessed highest number of branches per plant of 133.33 branches plant^{-1}.

Yields traits

Differences in plant yield were observed between the eight cultivars. Ambrozja had l[argest seeds per umbellate of 72.44 seeds, followed by Erbil of 56.42seeds. Whereas bushy possesses least seeds per umbellate of 22.11seeds. Erbil possesses highest number of umbellate of 8.83 umbellate umbel^{-1}, followed by ambrozja of 5.83 umbellate umbel^{-1}.while super had lowest umbellate of 1.5 umbellate umbel^{-1}. Erbil achieved highest umbel per plant of 11 umbel plant^{-1}, followed by bushy of 7.42 umbel plant^{-1} and mushroom of 7.25 umbel plant^{-1}. Ambrozja had lowest umbel per plant of 4.94 umbel plant^{-1}.Seeds of ambrozja were heaviest which achieved 4.42 g seeds per plant followed by agrodowy of 2.2g seeds per plant. This might be due to difference in their genotypic potential and better adaptability to soil and climate. The similar result was reported by Malhotra and Vashistha (2007) in dill, Malhotra (2008) in nigella and Balai *et al* (2011) in coriander.

The genotype performance varies with location season and management practices, phenotypic expressions of the plant character are mainly controlled by the combined product of genetic constituents of the plant and environment. It is essential to study the available genotype in controlled environment. The positive effect of environmental factor on growth and yield could be harnessed, if the information on is with the availability of improved varieties made available. Thus, Franszcz. Malhotra and Vashistha (2007) studied the response of Indian dill (Anethumsowa) and European dill (*Anethum graveolens*) varieties to different agro-techniques. Result reveals that the Indian dill and European dill recorded the highest plant heightand primary branches per plant. Both genotypes had delayed flowering withfurther delay in sowing. The highest number of umbels per plant, umbellate perumbel, seeds per umbel, test weight and seed yield were recorded when the Indiandill was sown on 15 October and the European dill on 1 October. The higher value for growth parameters recorded in cultivar NRCSS AD-1 is might be one of the reasons as these parameters contribute directly or indirectly towards yield and yieldattributing characters. Similar results were also reported by Malhotra *et al* (2007) in dill, Malhotra and Vashistha (2008) in nigella and Balai and Keshwa (2011) in coriander.

Variability is pointed using GCV, PCV and heritability in Table 3. Thus, results revealed that PCV values were closed to those one of GCV. However the biggest values of PCV were registered in seed number per umbellate of 69.748%, followed by umbel per plant of 63.708%, seed weight of 48.604%, whereas the lowest value was

Table 1 : Average of some vegetative traits of dill grown under wood house conditions

Cultivars	Plant height(cm)	Dry weight(g)	Branches
Erbil	53.11	1.73	48.92
Gribovsky	64.17	2.94	52.83
Superdukat	48.08	1.74	38.17
Kustovoy	63.08	1.74	65.67
Ambrozja	38.89	1.98	133.33
Common	66.42	3.18	63.83
Agrodowy	70	2.3	60
LSD0.05	7.95	0.83	1.21

Table 2 : Average of some yield traits of dill grown under wood house conditions

Cultivars	Seeds per umbellate	Umbellate per umbel	Umbel per plant	Seed weight(g)
Erbil	56.42	8.83	11	1.72
Gribovsky	34.17	3.42	7.25	1.46
Superdukat	26.00	1.5	5.75	1.38
Kustovoy	22.11	3.11	7.42	2.06
Ambrozja	72.44	5.83	4.94	4.42
Common	30.75	2.47	5.25	1.99
Agrodowy	38	3	7	2.2
LSD0.05	4.83	2.09	1.25	0.46

Table 3 : Grand mean, GCV, PCV and heritability of some dill traits grown in pot in Iraq.

Traits	Grand mean	GCV %	PCV %	Heritability
Plant height	57.68	19.067	20.581	0.858
Dry weight	2.3	24.253	32.080	0.572
Branches	66.10	28.890	30.496	0.897
Seedsper umbellate	39.98	69.588	69.748	0.995
Umbellate per umbel	4.02	45.191	45.286	0.996
Umbel per plant	6.94	61.264	63.708	0.925
Seed weight	2.17	47.107	48.604	0.939

recorded in plant height of 20.581%. The same trend was obtained in GCV values. Where seeds per umbellategave the highest value of 69.588, followed by umbel per plant of 61.264%, seed weight of 47.107 and umbellate per umbel of 45.191%. Plant height achieved the smallest value of 19.067%. Heritability values were highly augmented for umbellate per umbel of 99.6, followed by seeds per umbellate of 99.5, seed weight of 93.9 and umbel per plant of 92.5. Dry weight registered the lowest heritability of 57.2. Thus, ratio of PCV could due to GCV. TRAITS could be truly different among genotypes and genetically as environment effect was decreased (Yadav *et al*, 2013; Abou El-Nasr *et al*, 2013; Yogi *et al*, 2013; Almehemdi *et al*, 2015). Thus, these traits could be used as selective tools depended on phenotypic trait expression as these traits are effected via additive gene (Rawat *et al*, 2013), especially in dill genotypes produced in pots or containers.

Selection depended on these traits could be represented as path to improve superior genotypes of dill when heritability and genetic gain are together increased as both parameters are interesting in selection to improve certain traits (Abou El-Nasr *et al*, 2013).

CONCLUSION

A remarkable phenotypic variation could be revealed in geographical landraces which stated a correlation between the agro-morphological traits with the geographical region of origin interpreting the effect of the environment on these landraces (Ninou *et al*, 2017).

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