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Survey for occurrence and severity of dracaena leaf spot in Egypt

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ABSTRACT

Occurrence of leaf spot of dracaena in the four Egyptian governorates Alexandria, Behira, Cairo and Giza) surveyed over the three years 2007-2010 and the 4 periods. of sampling ranged between 3.95% and 96.33% with disease severity ranged between 4.37% and 66.71% on the fourteen dreaceana cultivars tested. Corn Plant cv. was the most tolerant dracaena cultivar as showed overall mean occurrence and severity over the study being 15.65% and 9.03%, respectively, which was significantly lower than the other thirteen dracaena cultivars. This was followed by, cv. Massangeana and White Stripe with occurrence and severity being 19.04 % & 18.04% and 22.73% & 18.29% for the two cultivars, respectively. The highest occurrence (52.11%) and severity (32.48%) values, *i.e*. the highest susceptibility, was exhibited by Song of Jamaica. This was followed by cv. Sanderiana as showed occurrence and severity as high as 38.53% and 30.03%, respectively. In same context, periods of sampling significantly affected both occurrence and severity of dracaena leaf spot disease over the three years of the investigation. Period of (November: January) consistently showed the highest occurrence and severity with overall mean of 40.0% and 32.9%, respectively. Period of (May: July) showed the lowest occurrence and severity being 21.3% and 12.9%, respectively, the other periods of sampling *i.e.*, February: April and August: October, exhibited intermediate values. Consequently, the present study revealed the situation of leaf spot disease of dracaena in four of major governorates for draceana cultivation and its occurrence and severity on most dracaena cultivars in Egypt.

Keywords: Dracaena, cultivars, leaf spot, occurrence, severity.

INTRODUCTION

Dracaena is one of the most widely used and well-liked ornamentals in Egypt and around the world, it started to play a significant and cost-effective role in the horticultural sector (Arce *et al*., 2009; Hilal *et al*., 2016). Dracaena cultivars are preferred as indoor ornamental plants due to their wide range of shapes, colors, and forms as well as their minimal maintenance requirements for low light levels (Chen *et al*., 2002). Tropical and subtropical regions of Africa, Asia, and Australia are home to its center of origin (Poole *et al*., 2006 and Hui-Chi *et al*., 2013

Dracaena cultivars can be grown indoors as little potted ornamentals commonly found in homes, workplaces, and greenhouses, or outdoors as tree-like plants up to 60 feet high. Temperatures between 75°F and 90°F are ideal for dracaena growth (Franco *et al*., 2006).

As a premium leaf ornamental plant, dracaena foliage production is a growing agricultural industry in Egypt. These days, ornamental plants are essential to solving the major issues of environment (Rocha *et al*., 2022). Its leaves and roots have also been used as

herbs or medicinal plants in traditional remedies for snakebite, cough, flu, respiratory tract irritation, diarrhea, and wound healing throughout Asia and Africa and also occasionally used for household chores for weaving into mats and baskets (Atisari and To'bungan, 2024).

In Egypt, wherever there are warm, humid circumstances, dracaena plant leaves are attacked by a number of pathogens that cause leaf spot disease in shade and greenhouses (Hilal *et al*., 2016). Fungal leaf spots on the dracaena plant have been worse and serious recently. These infections can cause heavy defoliation, which can result in significant losses (Xing-Hong *et al*., 2011; Álvaro *et al*., 2012). The prevalence of fungal leaf spots that cause leaf deformation and fall has significantly increased lowering dracaena productivity (Chaiwan *et al*., 2020).

According to Ajay (2014), the initial signs of dracaena leaf spot include several tiny lesions that can quickly cover the majority of the leaves. As the infection worsens, wet, gelatinous, buff to salmon-colored spores cover the lesion's surface. The present study focused light on and revealed leaf spot disease of dracaena and its occurrence and severity on most dracaena cultivars in four of the major governorates for cultivation and trading of dracaena in Egypt.

MATERIALS AND METHODS

A fungal leaf spot survey on dracaena was conducted during the 2007–2008, 2008–2009, and 2009–2010 seasons. In some Egyptian governorates *i.e.* Alexandria, Beheira, Cairo, and Giza. Samples were collected from various trade stores, nurseries, and green houses in various places. Four consecutive periods were used for this: February, March, and April for the first period, May, June, and July for the second period, August, September, and October for the third period, and November, December, and January for the fourth period. Fourteen dracaena cultivars represent five dracaena species (Table 1) were surveyed for occurrence and severity of leaf spot disease.

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Table 1. Dracaena species and cultivars surveyed in the present study for occurrence and severity of leaf spot disease.

Species	Cultivar
Dracaena deremensis	"Lemon Lime", "White Stripe" and "Warneckii"
Dracaena fragrans	"Golden coast" and "Green Corn Plant"
Dracaena marginata	"Bicolor" (local) and "Tricolor"
Dracaena reflexa	"Song of India" and "Song of Jamaica"
Dracaena sanderiana	"Sanderiana"

Samples of dracaena leaves exhibiting leaf spot were gathered from nurseries, trade stores, and greenhouses throughout the four governorates of Egypt.

Percentage of infection with leaf sopt disease was determined according to (Thongkantha *et al*., 2008, and Morang *et al*., 2012) as follows:

$$\text{Percentage of infection plants} = \frac{\text{No. of infected plants}}{\text{Total No. of examined plants}} \times 100$$

Also, the disease severity was calculated by carefully examining each plant exhibiting symptoms of the leaf spot disease, assigning a rating, and then converting the ratings to the degree of infection (%) using the following scale degrees system according to (Abd El-Zaher *et al*., 2005): "0=No disease symptoms, 1= Few scattered lesions covering about 1-25% of the leaf, 2= Spots covering about >25-50% of the leaf, 3= Spots coalescing and covering about > 50-75% of the leaf, 4=Infection with coalescing spots covering > 75% -100% of leaf. The equation proposed by Abd El-Zaher *et al*. (2005) was used to determine the disease severity.

$$\text{Disease severity} = \frac{\sum \text{number of plants under scale degree X scale degree}}{\text{Degree of freedom of scale (5) X Total number of plants examined}} \times 100$$

Statistical analysis:

According to Gomez and Gomez (1984), the obtained data were statistically analyzed using SAS (Statistical Analysis System) version 9.2, 2001. The treatment means were compared at the 5% level of probability using the least significant difference (L.S.D.) test.

RESULTS AND DISCUSSION

Dracaena cultivars and species are widely recognized as significant foliage ornamentals and medicinal plants in Egypt and other parts of the world (Wagih *et al*., 2008, Jia-Yi *et al*., 2014 and Vasudevan *et al*., 2024). Unfortunately, a number of plant diseases, especially fungal leaf spots, attack dracaena plants, endangering their cultivation and industry in Egypt and other countries Thongkantha *et al*., 2008, Nilam and Chaiwatanun, 2014 and Chaiwan *et al*., 2020).

In the present study a survey was conducted to reveal occurrence and severity of dracaena leaf spot disease in four different main government for dracaena cultivation in Egypt, *i.e.,* Alexandria, Behira, Cairo, and Giza in four consecutive periods of sampling in 2007-2010 and on fourteen dracaena cultivars.

Occurrence of dracaena leaf spot disease:

Effect of dracaena cultivars on occurrence of leaf spot disease of dracaena:

Data in Table (2) showed that occurrence of leaf spot of dracaena in the four Egyptian governorates surveyed *i.e.* Alexandria, Beheira, Cairo, and Giza, over the three years of the study ranged between 3.95% and 96.33% in the different periods of investigationson on the different dreaceana cultivars tested. However, cv. Corn Plant (*D. fragrans*) was the most tolerant dracaena cultivar as showed overall mean occurrence (percentage of infection, PI) over the study being 15.65% which was significantly lower than the other thirteen dracaena cultivars. This was followed by cv. Magenata which showed PI of 18.98%, and Massangeana with 19.04 % PI. Meanwhile, cvs. White Stripe and cv. Golden Coast showed overall mean PI of 22.73% and 23.92%, respectively. Also, cv. Lemon Line, cv. Compacta, cv. Tricolor" and cv. Colorama showed overall mean PI ranged between 27.79%- 29.52% while rest of cultivars showed PI ≥ 30% with the highest PI value (52.11%), *i.e*. the highest susceptibility, was exhibited by cv. Song of Jamaica (Fig. 1). These findings are in harmony with Álvaro *et al*. (2012), and Sharma *et al*. (2014).

Effect of period of the year on occurrence of dracaena leaf spot disease:

Data in Table (2) illustrated in Fig. (2) showed that period of sampling significantly affected occurrence of dracaena leaf spot over the three years of the investigation. However, period of (November to January) showed the highest occurrence of dracaena leaf spot with overall mean PI of 40.0% this was followed by the period (August: October) which is before, and the period (February: April) which is after, with overall mean PI being 27.1% for both periods of sampling. On the other hand, period of sampling of (May: July) showed the lowest occurrence of 21.3% (Fig. 2). Palmucci and Barreto (2007), Wagih *et al*. (2008) and Ghosh *et al*. (2009) concur with these findings.

Table 2. Occurrence (infection %) of draceana leaf spot on fourteen dracaena cultivars surveyed in Egyp over four consecutive periods during 2007–2010.

Species and "cultivars"	Percentage of infection plant (in survey)																			
	Period One (Feb. : Apr.)			Mean	Period Two (May.: July)			Mean	Period Three (Aug. : Oct.)			Mean	Period Four (Nov. : Jan.)			Mean	Overall means			Mean
	2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010	
D. d. "Compacta"	37.67	28.04	23.85	29.85	27.67	16.07	15.65	19.80	29.68	15.27	21.56	22.17	66.17	30.27	34.94	43.79	40.30	22.41	24.00	28.90 E
D. d. "Lemonline"	25.36	15.29	13.20	17.95	21.35	21.09	20.11	20.85	36.00	28.67	32.41	32.36	41.17	37.83	40.98	39.99	30.97	25.72	26.68	27.79 E
D. d. "White Stripe"	15.52	13.73	15.20	14.82	21.83	15.21	13.15	16.73	29.55	22.92	25.34	25.94	36.31	36.62	27.43	33.45	25.80	22.12	20.28	22.73 F
D. d. "Warneckii"	31.80	28.78	41.20	33.93	32.26	20.13	21.78	24.72	12.54	43.88	43.83	33.42	23.02	60.10	47.63	43.58	24.91	38.22	38.61	33.91 CD
D. f. "Massangeana"	13.87	16.94	17.94	16.25	13.77	14.97	14.56	14.43	13.17	16.17	20.77	16.70	30.44	33.28	22.59	28.77	17.81	20.34	18.97	19.04 G
D. f. "Golden Coast"	25.29	25.38	26.02	25.56	9.07	6.23	5.07	6.79	17.90	21.35	13.80	17.68	47.00	43.59	46.34	45.64	24.82	24.14	22.81	23.92 F
D. f. "Corn Plant"	17.37	19.63	19.80	18.93	13.97	16.48	14.27	14.91	3.95	18.33	14.55	12.28	9.20	19.44	20.77	16.47	11.12	18.47	17.35	15.65 H
D. m. "Bicolor"	17.83	32.13	34.61	28.19	25.46	17.94	19.41	20.94	22.40	30.56	36.98	29.98	30.16	48.56	46.31	41.68	23.96	32.30	34.33	30.20 DE
D. m. "Tricolor"	32.79	19.82	20.15	24.25	21.35	17.25	12.38	16.99	30.93	24.09	28.71	27.91	47.13	50.45	44.68	47.42	33.05	27.90	26.48	29.14 E
D. m. "Colorama"	20.78	24.78	26.34	23.97	23.05	19.13	18.77	20.32	37.34	29.94	21.54	29.61	64.19	46.75	22.52	44.49	36.34	30.15	22.29	29.59 E
D. m. "Magenata"	13.92	16.15	22.17	17.41	9.98	13.39	20.19	14.52	12.18	21.28	16.71	16.72	17.05	34.49	30.27	27.27	13.28	21.32	22.34	18.98 G
D. r "Song of India"	32.33	36.21	33.40	33.98	25.10	33.00	28.33	28.81	24.36	34.77	33.24	30.79	38.25	42.71	39.81	40.26	30.01	36.67	33.70	33.46 C
D. r. "Song of Jamica"	88.33	38.10	30.81	52.41	91.00	35.33	27.83	51.39	94.17	26.71	27.05	49.31	96.33	40.68	28.99	55.33	92.46	35.21	28.67	52.11 A
D. s. "Sanderiana"	34.33	46.67	43.28	41.43	21.33	26.38	31.33	26.35	42.07	31.05	30.27	34.46	71.43	40.33	43.83	51.86	42.29	36.11	37.18	38.53 B
Mean	29.1 b	25.8 b	26.3 b	27.1B	25.5 c	19.5 c	18.8 c	21.3C	29.0 bc	26.1 b	26.2 b	27.1B	44.1 a	40.4 a	35.5 a	40.0A	31.9 A	27.9 B	26.7 B	28.85
L.S.D. $_{0.05}$ for interaction	7.13																9.47			11.46
	7.68																			

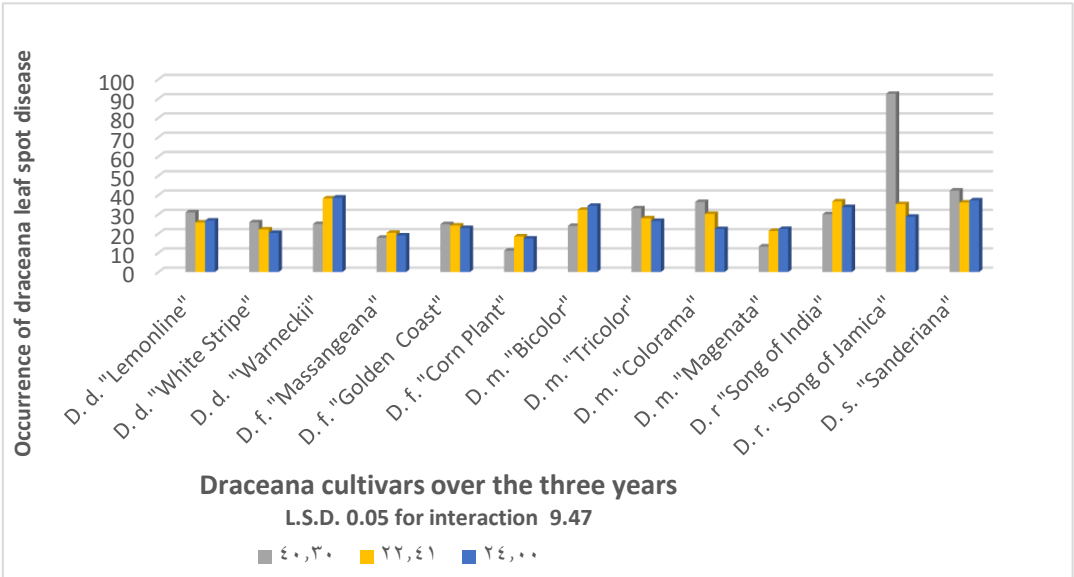

Fig.1. Occurrence of draceana leaf spot disease on the fourteen surveyed draceana cultivars over the three years of the study.

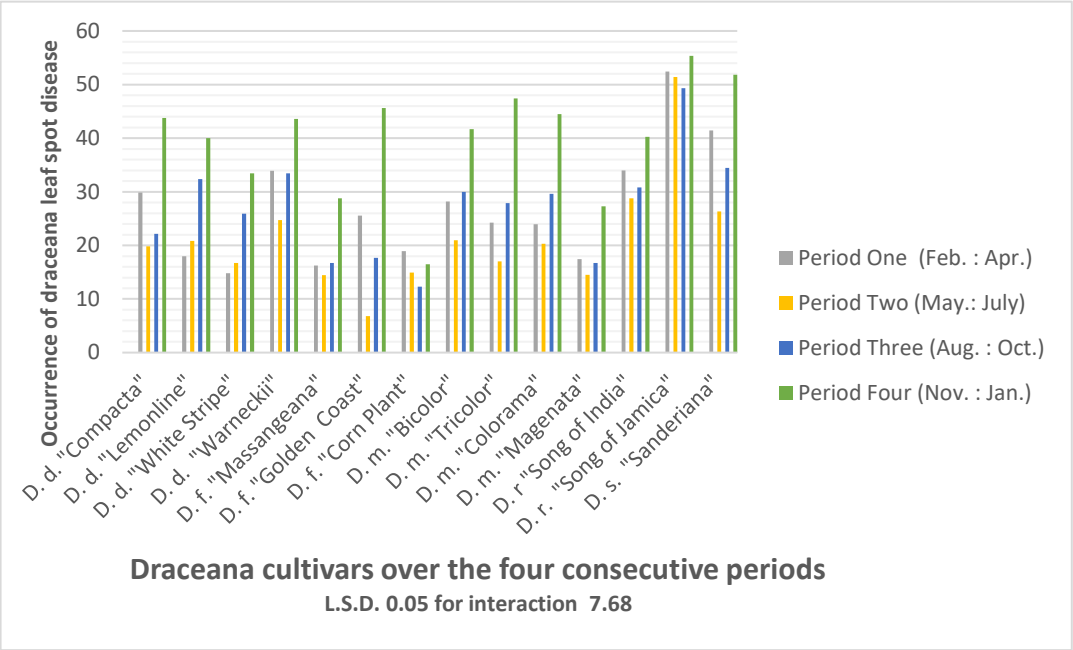

Fig.2. Effect of sampling periods on occurrence of leaf spot disease of draceans.

2. Dracaena leaf spot disease severity:

Effect of dracaena cultivars on severity of leaf spot disease of dracaena:

Data in Table (3) showed that severity % (DS%) of leaf spot of dracaena in the four Egyptian governorates surveyed *i.e.* Alexandria, Beheira, Cairo, and Giza, over the three years of the study ranged between 4.37% and 66.71% in the different periods of investigationson on the different dreaceana cultivars tested.

However, cv. Corn Plant (*D. fragrans*) was the most tolerant dracaena cultivar as showed overall mean DS% over the study being 9.03% which was significantly lower than the other thirteen dracaena cultivars . This was followed by cv. Warneckii, cv. Compacta, cv. Magenata, cv. White Stripe, and cv. Song of India with DS% ranged between 16.24% and 18.46%.

Meanwhile, cv. Bicolor, cv. Golden Coast, Lemon Line, and Colorama showed DS% ranged between 23.43% and 26.88 while the remaining tested cultivars, *i.e.* cv. Sanderiana, cv. Tricolor, and cv. Song of Jamaica showed the highest DS%, *i.e.* the highest susceptibility, between 30. 02% – 32.48% with no significant differences between them and the highest DS% value was exhibited by cv. Song of Jamaica (Fig. 3). These findings are in harmony with Wagih *et al*. (2008) and Golzar and Wang (2010).

Effect of period sampling on disease severity of dracaena leaf spot disease:

Data in Table (3) illustrated in Fig. (4) showed that period of sampling significantly affected DS% of dracaena leaf spot over the three years of the investigation.

However, period of (November to January) showed the highest DS% of dracaena leaf spot with overall mean of 32.9% this was followed by the period (August: October) with DS% of 24.4, while period (February: April) showed 17.4 DS%. On the other hand, period of sampling of (May: July) showed the lowest DS% being 12.9% (Fig. 4).

Such variations among dracaena cultivars in their tolerance and susceptibility to leaf spot disease could be explained in view of the expected variations in their morphological and anatomical features as well as their content of phenols and other defense related compounds and activity of the oxidative enzymes. These findings are in harmony with Álvaro et al. (2012), and Sharma *et al.* (2014).

Also in same context the obtaind results revealed that period of sampling significantly affected both occurrence and severity of dracaena leaf spot disease over the three years of the investigation.

while the other periods of sampling exhibited intermediate values. These results are in agreement with Palmucci and Barreto (2007) and Ghosh *et al.* (2009), This could be interpreted in view that weather in period (November: January) is commonly wet and humidity is high while period (May: July) is very dry in the surveyed governorates.

These findigs are in agreement with Zaher *et al*. (2005), Phoulivong (2011), Chaiwan *et al.* (2020), and and Vasudevan *et al*. (2024).

Table 3. Disease severity (%) of draceana leaf spot on fourteen dracaena cultivars surveyed in Egypt during four consecutive periods in 2007-2010.

Species and "cultivars"	Percentage of infection plant leaves (in survey)																			
	Period One (Feb. : Apr.)			Mean	Period Two (May.: July)			Mean	Period Three (Aug. : Oct.)			Mean	Period Four (Nov. : Jan.)			Mean	Overall means			Mean
	2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010		2007/2008	2008/2009	2009/2010	
D. d. "Compacta"	7.76	14.72	13.36	11.95	12.21	11.57	9.37	11.05	18.02	22.13	17.82	19.32	20.85	24.70	33.02	26.19	14.71	18.28	18.39	17.13 FG
D. d. "Lemonline"	19.88	19.76	18.79	19.48	20.34	19.38	14.07	17.93	32.62	27.87	35.49	31.99	32.92	36.02	29.37	32.77	26.44	25.76	24.43	25.54 CD
D. d. "White Stripe"	12.85	15.40	10.88	13.04	19.80	16.26	9.64	15.23	20.72	18.27	20.37	19.79	23.91	21.71	29.67	25.10	19.32	17.91	17.64	18.29 F
D. d. "Warneckii"	13.95	11.18	9.44	11.52	13.59	4.39	6.80	8.26	23.45	18.16	17.96	19.86	25.85	19.28	30.81	25.31	19.21	13.25	16.25	16.24 G
D. f. "Massangeana"	11.85	22.02	13.02	15.63	8.25	10.06	8.01	8.77	19.67	21.08	19.44	20.06	24.87	23.17	35.09	27.71	16.16	19.08	18.89	18.04 FG
D. f. "Golden Coast"	16.22	14.03	13.46	14.57	15.96	15.40	15.10	15.49	31.74	28.55	30.46	30.25	37.62	31.96	36.02	35.20	25.38	22.49	23.76	23.88 DE
D. f. "Corn Plant"	6.11	10.95	5.98	7.68	5.92	5.18	4.61	5.24	8.63	12.31	9.98	10.31	12.38	16.47	9.79	12.88	8.26	11.23	7.59	9.03 H
D. m. "Bicolor"	8.72	21.93	22.15	17.60	11.32	9.13	7.66	9.37	18.18	27.85	28.22	24.75	33.75	41.18	51.06	42.00	17.99	25.02	27.27	23.43 E
D. m. "Tricolor"	25.24	20.01	27.50	24.25	12.96	9.93	6.44	9.78	37.31	35.22	34.72	35.75	61.56	39.44	52.18	51.06	34.27	26.15	30.21	30.21 AB
D. m. "Colorama"	17.69	24.25	26.06	22.67	21.00	11.28	12.82	15.03	43.04	24.74	28.77	32.18	59.06	24.24	29.62	37.64	35.20	21.13	24.32	26.88 BC
D. m. "Magenata"	9.33	19.80	29.84	19.66	9.86	10.21	11.78	10.62	8.48	21.78	21.14	17.13	11.54	25.85	26.97	21.45	9.80	19.41	22.43	17.21 FG
D. r "Song of India"	15.55	15.12	11.41	14.03	12.02	8.50	10.31	10.28	26.65	12.44	17.15	18.75	38.12	25.39	28.81	30.77	23.09	15.36	16.92	18.46 FG
D. r. "Song of Jamica"	29.39	21.62	19.20	23.40	66.71	10.84	12.15	29.90	74.62	15.91	17.10	35.88	69.82	25.17	27.21	40.73	60.14	18.39	18.92	32.48 A
D. s. "Sanderiana"	26.16	28.98	30.44	28.53	17.22	11.90	11.19	13.44	33.94	24.59	19.29	25.94	75.98	41.68	38.89	52.18	38.33	26.79	24.95	30.02 A
Mean	15.76 cd	18.56 c	18.0 c	17.4C	17.65 c	11.0 d	10.0 d	12.9D	28.36 b	22.21 bc	22.71 bc	24.4B	37.73 a	28.3 b	32.75 a	32.9A	24.88 A	20 B	20.86 B	21.92
L.S.D. $_{0.05}$ for interaction	6.89																	7.26		9.76
	6.38																			

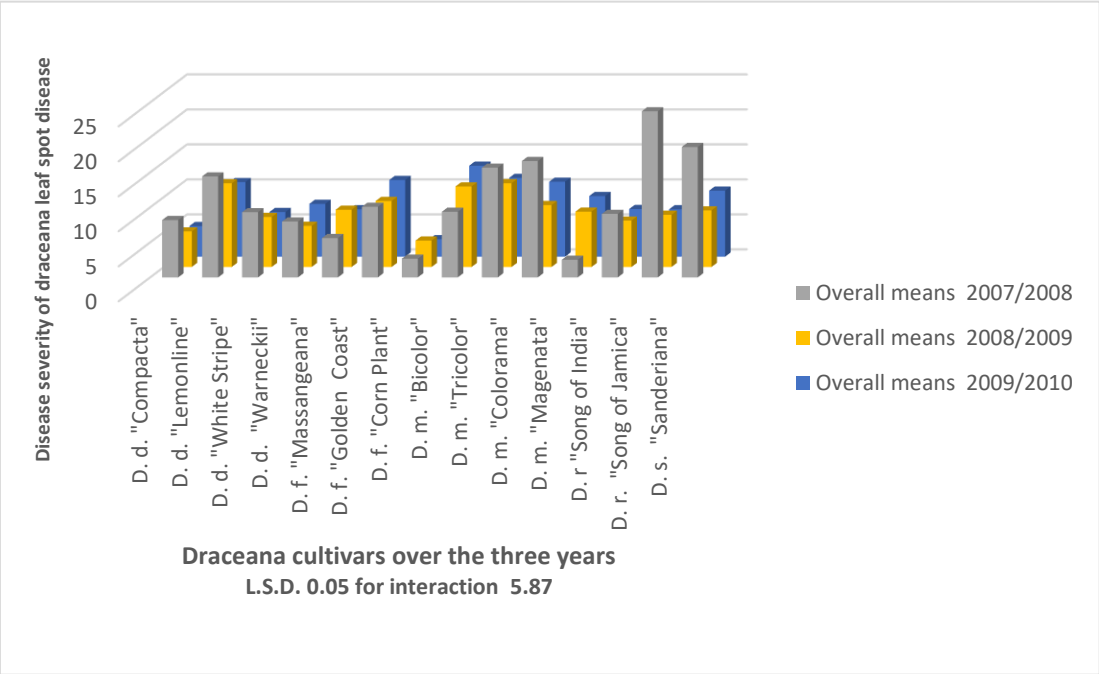

Fig.3: Disease severity of draceana leaf spot disease on the surveyed fourteen draceana cultivars over the three years of the study.

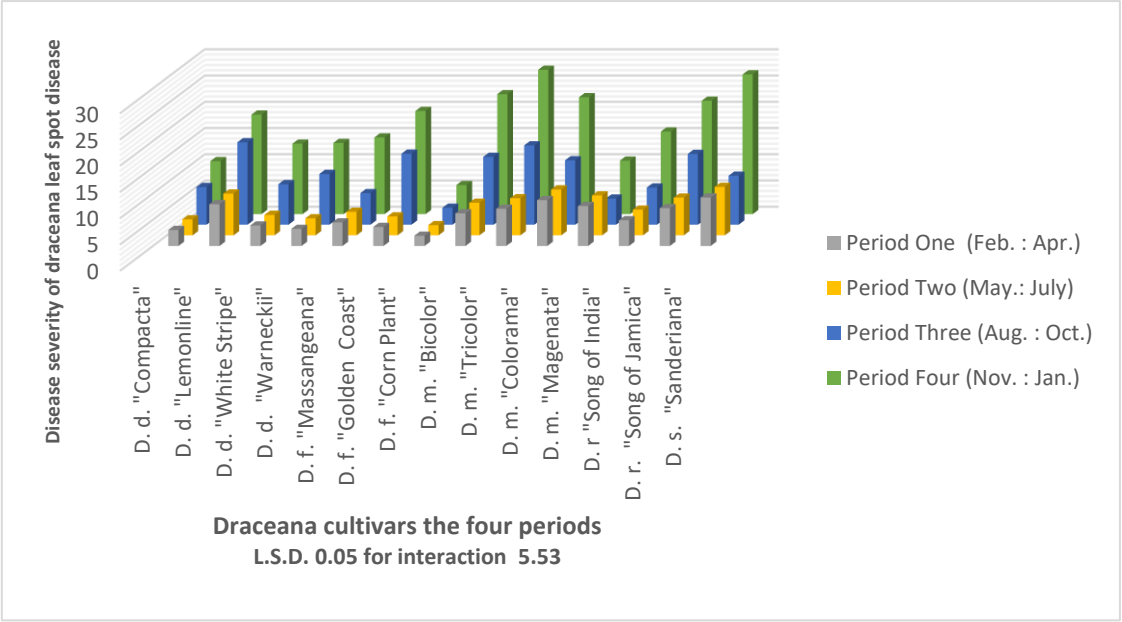

Fig.4: Effect of sampling periods on disease severity of leaf spot disease of draceans.

Conclusion:

This study addressed a local problem related to leaf spot disease on *Dracaena* sp. in some nursery plants in Egypt. Several diseases, like leaf spots, which are more prevalent in warm, humid climates and can result in significant losses, usually affect the value and appearance of Dracaena foliage plants, which are valued in Egypt and many other parts of the world and have grown to be a financially significant part of the horticultural industry. Thus, the goal of the current study was to survey the occurrence and determine the prevalence of leaf spot diseases on fourteen distinct *Dracaena* cultivars, the *Dracaena reflexa* "Song of

Jamaica" was the most susceptible dracaena cultivar as exhibited, while *D. fragrans* "Corn Plant" was the most tolerant one. Throughout the three-year study, sampling intervals had a significant impact on the incidence and severity of dracaena leaf spot disease. November through January, the fourth period, consistently displayed the highest frequency and severity. The lowest occurrence and severity were found in the second period (May–July); the other two sampling periods (February–April) and third (August–October) showed intermediate values. Thus, the current study documented the prevalence and severity of dracaena leaf spot disease on the majority of Egyptian dracaena cultivars in four of the major governorates, namely Alexandria, Behira, Cairo, and Giza.

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