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EFFECT OF N- FERTILIZATION RATES AND SMALL-FLOWER UMBRELLA, (*CYPERUS DIFFORMIS,* L.) COMPETITION ON BROADCAST-SEEDED RICE, (*ORYZA SATIVA, L.*) PRODUCTIVITY AND NUTRIENTS UPTAKE

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ABSTRACT

Two field experiments were conducted at Gemmeiza Agric. Res. Station, Gharbia Governorte, Egypt, during 2015 and 2016 summer seasons. The objective of this work was to study the effect of nitrogen fertilizer rates and small-flower umbrella (*Cyperus difformis* L.) competition on broadcast rice productivity and nutrient uptake. Each experiment included eighteen treatments. (The combination of three nitrogen fertilizer rates 50, 70 and 90 kg N fed^{-1}, and six of *Cyperus difformis* L. densities, *i.e.*, zero, 10, 20, 40, 80 and 100 (naturally infestation) plant m^{-2}). A split plot design, with four replications, was used. The results revealed that increasing nitrogen rates increased significantly the studied broadcast rice growth parameters, yield and its components, in both seasons. Where the application of 70 and 90 kg N fed^{-1} increased grain yield by 11.45 and 18.91 % in the first season and 12.92 and 18.92 % in the second season, respectively, compared to the lowest nitrogen fertilizer rate. Also, increasing nitrogen fertilizer rates had significant effect on most of NPK % of both broadcast rice and *Cyperus difformis* L. plants at 60 and 80 days after sowing. N, P and K % decreased with growth in both broadcast rice and *Cyperus difformis* L. plants and were higher in *Cyperus difformis* L. than broadcast rice in N% showing that *Cyperus difformis* L. plants is a major competitor of broadcast rice plants for N nutrient. Moreover, the addition of nitrogen fertilizer rates significant affected N, P and K %, NPK uptake and protein% in broadcast rice grain. Application of 70 and 90 kg N fed^{-1} increased protein % in grain broadcast rice by 9.54 % and 11.23 % respectively in the second season, compared to 50 kg N fed^{-1}. On the contrary, increasing *Cyperus difformis* L. density m^{-2} had an adverse effect on broadcast rice growth, yield and its components in both seasons. Increasing number of *Cyperus difformis* L**.** plants from 10 to 100 m^{-2} reduced the grain yield by 5.37 to 47.43 % in the first season and 7.98 to 48.88 %, in the second season compared to *Cyperus difformis* L. free treatment. Positive significant effects were detected for *Cyperus difformis* L. density m^{-2} on N, P and K % of both broadcast rice and *Cyperus difformis* L. plants at 60 and 80 days after sowing as well as broadcast rice grain contents of N, P and K and protein in both seasons. Increasing *Cyperus difformis* L. plants from 10 to 100 m^{-2} decreased grain protein % from 0.17 to 2.11 % in the first season and 0.17 and 1.09 % in the second season compared with *Cyperus difformis* L. free plots. The interaction between 90 kg N fertilization rate and zero *Cyperus difformis* L. plant m^{-2} gave the highest broadcast rice grain yield (4.21 and 4.15 ton fed^{-1}) compared with 50 kg N fertilization rate and 100 *Cyperus difformis* L. plant m^{-2} which gave (1.84 and 1.71 ton fed^{-1}) in the first and second seasons, respectively. The main findings of this investigation indicate that *Cyperus difformis* L. weed should be controlled to avoid broadcast rice grain yield losses due to its competition through integration between nitrogen fertilization and weed control treatments to get the highest grain yield of broadcast rice.

Key words: *N- fertilization, small-flower umbrella Cyperus difformis, L. density, Broadcast- seeded rice (Oryza sativa, L.), Growth, yield and yield components.*

1.INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important cereal summer crops in Egypt, and is considered as a daily popular diet. Raising rice productivity per unit land area is very essential issue to meet the consistent increased population demands. Improvement of rice production can be achieved through replacement of the traditional cultivated varieties by new high-yielding ones as well as optimizing the cultural practices.

Fertilizers play an important role in increasing rice grain yield productivity. Nitrogen is an important limiting element for rice growth, and its lack causes yield reduction in each stage, (Haefel *et al.*,2006). The proper dose of N-fertilizer is considered a key to high crop production. However, Singh *et al.* (2017) reported a clear increase in photosynthetic capacity, specific leaf area, leaf area index, leaf area ratio, biomass accumulation and relative growth rate due to N application in all studied weed species. The authors added that, compared to the rice crop, weeds had a higher leaf area, and showed more efficient biomass gain with increasing N input. Belder *et al.* (2005) showed that rice grain yield increased with increasing nitrogen amount. In addition, Revathi (2009) found that lower weed density and weed dry matter in direct planting system entailed lower N removal by weeds. Seema and Tohi (2010),found that increased N level from 75 to 100 kg/ha had increased the grain yield of direct seeded aerobic rice significantly (5%), though further increase in nitrogen dose (125 kg/ha) increased the grain yield insignificantly. The authors added that dry matter accumulation by the plant also increased by the increment of nitrogen. Weed dry weight at 60 DAS seemed to increase gradually with N dose, increment without significant differences. The increased levels of N increased the nutrient uptake by weeds at 60 DAS, but this increase was statistically insignificant in case of N and P, and significant in case of K uptake. El-Dalil *et al.* (2017) reported that rice grain yield and all yield components were significantly affected due to the adopted N levels, and 40 Kg N fed^{-1} rate provided the maximum values in comparison with 0, 20 and 60 Kg N fed^{-1} rates. The authors found that the highest number of filled grains panicle^{-1}, Number of panicles m^{-2} and 1000 grain weight were obtained with 40 Kg N fed^{-1} rate. Jain *et al.* (2018) reported that application of 125kg N/ha gave significantly higher plant height, tillers m^{-2}, panicles m^{-2}, grains panicle^{-1}, 1000 grain weight, grain and straw yields. In addition, nitrogen, phosphorus and potassium uptake significantly increased,also. However, 125 kg N/ha dose was statistically at par with 100 kg N ha^{-1} one.

"Small-flower"umbrella(*Cyperus difformis* L.) is considered as a serious competitor weed of rice crop in Egypt. Such weed is described as a vigorously growing weed with the capability to attain greater height, establish and develop extensive leaf area and horizontal branches when moisture and nutrients are not limiting, with respect to rice crop performance as affected by the associated weeds and its density. In connection, Estorninos *et al*. (2005) found that the number of tillers decreased from 20 to 48 % with the increase of weeds density from 25 to 51 plants per m^{-2}. Singh *et al*. (2005) reported 51.9% reduction in grain yield due to weed infestation was registered in weedy check treatment. Singh *et al*. (2007) stated that both weed density and dry weight were negatively correlated with rice grain yield. Aerobic direct-seeded rice treatment produced yield and net economic returns similar to conventionally puddled transplanted rice treatment when weeds were controlled. Kumar *et al.* (2008) reported that in the absence of weed control, rice yield get reduced by 35-100% in direct-seeded rice. Maity and Mukherjee (2008) reported that uncontrolled weeds reduced the grain yield by 96 % in dry direct seeded rice and 61 % in wet direct seeded rice. Singh *et al*. (2009) found that weed infestation in direct seeded rice resulted in yield loss up to 30 to 90 %, reduced grain quality and enhanced the cost of production. Sheeja *et al*. (2013) observed reductions in grain yield due to crop weed competition, compared to weed free situation, and 72 % reduction in grain yield was noticed due to the infestation of broad leaved weeds and sedges in direct seeded rice.

The objective of the present work was to investigate the effect of *Cyperus difformis* L. densities on rice crop performance under different nitrogen fertilization rates in Gharbia Governorate, Middle Nile Delta, Egypt.

2.MATERIALS AND METHODS

Two field experiments were conducted in heavily and natural infested soil with "small-flower"umbrella (*Cyperus difformis* L.) weed at Gemmeiza Agricultural Research Station Farm, Gharbia Governorate, Egypt, Agriculture Research Center, in the two summer seasons of 2015 and 2016. The experiments aimed at studying the effect of "small-flower" umbrella plant densities on rice growth and yield productivity under different nitrogen fertilization rates. Data of particle size distribution and some chemical soil analyses, according to Jackson (1973), are shown in Table (1).

Table (1): Particale size distribution and some chemical properties of the experimental soil in 2015 and 2016 seasons.

Season	Particale size distribution			Soil texture	Chemical analyses													
								Available (mg kg^{-1})				Soluble anions and cations {meq100g soil^{-1} (1:5)}						
	Sand %	Silt %	Clay %		EC (dsm^{-1})(1:5)	pH (1:1)	Organic matter %	Total N (%)	P (ppm)	K (ppm)	Zn (ppm)	HCO_3^-	$SO4^-$	Cl^-	Ca^{++}	Mg^{++}	Na^+	K^+
2015	11.2	36.0	52.8	Clay	1.19	8.05	1.12	0.51	8.03	510.0	1.42	4.30	5.41	9.1	3.5	4.2	3.6	0.41
2016	21.5	31.2	47.3	Clay	1.74	7.80	1.62	0.40	7.35	375.0	0.78	9.50	7.37	9.5	4.5	3.5	8.95	0.42

Sakha 101 rice variety (*Oryza sativa* L.) was assessed, and the preceding winter crop was wheat (*Triticum astivum*, L.) in both seasons. Seeded rice was broadcasted at 10 and 15 May in the first and second seasons, respectively, at 60 kg fed^{-1} rate. The rice seeds were soaked in water for about 36 hours and then incubated for 24 hours. The other agricultural practices for rice production in the region were flowered. The adopted experimental treatments were laid out in split -plot design with four replicates. Plot area was 6.0 m^2 (2.0 m x 3.0 m). Each experiment included eighteen treatments, which were the combination of three rates NPK of fertilizers added in the main plots and six small-flower umbrella densities allocated in sub plots as follows:

2.1. The main plots were occupied by the assessed N- fertilizer rates namely:

1. Nitrogen fertilizer 50 kg N fed^{-1}
2. Nitrogen fertilizer 70 kg N fed^{-1}
3. Nitrogen fertilizer 90 kg N fed^{-1}

Nitrogen fertilizers were added in the form of urea (46.5 % N) in three equal doses as recommended for rice production in the area.

2.2.The sub-plots were assigned to the tested "small-flower"umbrella plant densities, namely

1- Zero small-flower umbrella plants m^{-2} (small-flower umbrella free)
2- 10 small-flower umbrella plants m^{-2}
3- 20 small-flower umbrella plants m^{-2}
4- 40 small-flower umbrella plants m^{-2}
5- 80 small-flower umbrella plants m^{-2}
6- 100 small-flower umbrella plants m^{-2} (as maximum natural infestation level in the experimental field).

After weeds emergence, the tested small-flowered umbrella plant densities were attained by manual thinning, and the remainder weed plants were covered with a plastic pots 15 cm in diameter. In order to control the other present weeds, Basagran 48 % AS (bentazone) at rate 1.5 l/fed^{-1} was applied 21 DAS, and Web Super 75 % EW (fenoxaprop-p-ethyl) at rate 300 cm^{3}fed^{-1} was applied 10 days later. At 40 DAS the tested (*Cyperus difformis*L.) densities were re-thinned manually to the final required population per the square meter.

2.3.Data recorded:

2.3.1.Fresh and dry weight of rice plants (g):

A sample of rice plants were taken randomly from ten rice plants from each sub-plot at 70 and 90 DAS and dried at 70°C (till the constant weight), and dry weight was determined as g m^{-2}.

2.3.2.Rice grain yield and yield components:

At harvest, ten guarded rice plants were hand pulled randomly from each sub-plot to determine plant height (cm), panicle length (cm), number of panicle m^{-2}, number of full grain panicle^{-1}, 1000 - grain weight (g), and all plants of the whole plot were harvested to determine grain and straw yields, which expressed as ton fed^{-1}.

2.4.Chemical analysis:

At 60 and 80 DAS, five plants of both small-flower umbrella (*Cyperus difformis* L.*)* and rice plants were chosen randomly from each sub-plot and oven dried at 70°C to determine nitrogen, phosphorus and potassium % in dry matter of rice and small-flower umbrella plants.

At harvest, grain samples were also dried at 70°C, and finally milled and wet digested according A.O.A.C. (1990) in order to determine nutrient concentrations. Total nitrogen was determined as described by Black (1965). Crude protein in rice grains was estimated by multiplying the total nitrogen % in rice meal by 5.7 according to Tkachuk (1966). Phosphorus %

was determined calorimetrically, and potassium % was determined by flame photometer as described by Jackson (1973). N, P and K taken up by the grain yield were calculated by multiplying N, P and K% by rice grain (yield fed^{-1}) and expressed as kg fed^{-1}.

2.5.Statistical analysis

Statistical analysis was carried out according to Gomez and Gomez (1984**)** using "MSTAT-C" computer software**.** The means values were compared at 5 % level of significance by using L.S.D. test. For regression study data were plotted and regression analyses were conducted. Linear $\hat{Y} = a + b X$ quadratic $\hat{Y} = a + b X - c X^2$ and cubic $\hat{Y} = a + b X + c X^2 + d X^3$ models were estimated to describe the relationship between the measured dependent variable of small-flower umbrella density (No. m^{-2}) and independent variables rice grain yield (ton fed^{-1}). $\hat{Y}$, variables and X, small-flower umbrella densities, a, b, c and d parameters represent intercept and slope of regression of variables and a regression models. The suitable model which fitted for prediction between the above mentioned variables quadratic regression analysis according to Sendecor and Cochran (1989) which is the correlation coefficient (R^2) was greater than other studied models and standard error values (SE) were smaller than those of the models.

3.RESULTS AND DISCUSSION

3.1. Effect of nitrogen fertilizer

3.1.1.Fresh and dry weight of rice plants

Data in Table (2) revealed that fresh and dry weights of rice plants at 70 and 90 days after sowing (DAS), tended to significantly increase at 0.05 level in both season by increasing nitrogen fertilizer rates from 50 up to 90 kg fed^{-1} in both seasons. The incident increases due to the highest rate (90 k fed^{-1}.) as compared to the lowest nitrogen rate reached 69.1 and 35.1 % for rice fresh and dry weight at 70 DAS and 34.2 and 27.8 % for rice fresh and dry weight at 90 DAS during the first season, respectively. The same trend was obtained in the second season with slight differences. The present findings showed that the highest dose of nitrogen fertilizer increased the growth of rice in terms of fresh and dry weights of the plants.In connection connection, Singh *et al*. (2017) reported that both rice and associated weeds plants exhibited higher leaf area, and showed more efficient biomass grain with increasing N input, and weed plants were superior in this respect.

3.1.2. Yield and yield components

Data in Table (3) illustrate that increasing nitrogen fertilizer rates significantly enhanced rice grain yield/fed and its components.

Nitrogen fertilizer rates, i.e. 70 and 90 kg N fed^{-1} rates induced significant increases comparing with 50 kg N fed^{-1} rate, which reached to 4.6 and 9.9 % in plant height , 15.02 and 30.40 % in panicle m^{-2} , 4.21 and 6.83 % in panicle length , 10.03 and 12.93 % in number full grain $panicle^{-1}$, 6.73 and 11.11 % in 1000-grain weight, and 21.58 and 30.25 % in straw yield in the first season, respectively. The same trend was observed with grain yield which significantly increased by 11.45 and 18.92 % with 70 and 90 kg N fed^{-1} rates, respectively, comparable with 50 kg N fed^{-1} rate in the first season. The corresponding increases in the second season, were 5.46 and 12.29 % in plant height, 4.03 and 6.11% in panicle length , 17.59 and 36.34 % in panicle m^{-2}, 10.34 and 13.10 % in number of full grains $panicle^{-1}$, 6.72 and 11.12 % in 1000-grain weight and 20.61 and 29.29 % in straw yield and 12.98 and 18.95 % grain yield, respectively. These results are in line with those of Singh *et al*. (2015) with direct seeded aerobic rice reported that growth and yield attributes viz. number of shoots, 1000 grain weight, number of grain $panicle^{-1}$, grain and straw yields were higher in the treatment receiving 150 kg N ha^{-1} , comparable with 90 and 120 kg ha^{-1} ones. In addition, Zimdahl (2004) found that nitrogen fertilizer increases the crop yield and improves the crop compatibility with the weeds, however, the addition of nutrient elements influenced the weed growth more than the crop when weed density is high.

3.1.3. NPK concentration of rice and (*Cyperus difformis* L.) plants

4. Generally, N, P and K concentrations in both rice and *Cyperus difformis* L. plants declined by elapsed time towards harvesting, indicating the translocation of the metabolized materials from the shoot to the storage organs. At 60 and 80 DAS, N concentration in (*Cyperus difformis* L.) plants was higher than that of rice plants. Whereas, P content exhibited an opposite trend, and such result was true at 60 and 80 DAS. K content in rice plants at 60 DAS exhibited higher values than in *(Cyperus difformis* L.) plants, and the trend was inversed at 80 DAS.

Table (2): Effect of N-Fertilizer rates on fresh and dry weight (g) of rice plants at 70 and 90 DAS in 2015 and 2016 seasons.

N -fertilizer rates (kg fed^{-1})	2015 season				2016 season			
	Days after sowing (DAS)				Days after sowing (DAS)			
	70	90	70	90	70	90	70	90
	Fresh weight (g)		Dry weight (g)		Fresh weight (g)		Dry weight (g)	
50	159.3	298.1	21.1	52.6	163.5	303.9	21.7	56.3
70	247.6	370.8	25.8	61.6	255.4	376.1	26.6	60.4
90	269.4	400.1	28.5	64.2	276.7	406.9	29.3	65.1
LSD $_{0.05}$	16.2	29.6	0.7	2.3	15.5	29.0	0..8	1.9

Table (3): Effect of N- Fertilizer rates on rice yield and its components in 2015 and 2016 seasons.

N- Fertilizer rates (kg N fed^{-1})	Plant height (cm)	Panicle length (cm)	No. Panicles m^{-2}	No. full grain panicle^{-1}	1000 grain weight (g)	Straw yield (ton fed^{-1})	Grain yield (ton fed^{-1})
	2015 season						
50	89.01	22.55	120.9	104.7	21.24	5.19	2.96
70	93.10	23.50	139.0	115.2	22.67	6.31	3.30
90	97.80	24.09	157.6	118.2	23.60	6.76	3.52
LSD $_{0.05}$	2.73	0.16	6.8	1.14	0.92	0.38	0.06
	2016 season						
50	81.34	22.08	114.2	106.3	21.14	4.95	2.85
70	85.78	22.97	134.3	117.3	22.56	5.97	3.22
90	91.34	23.43	155.7	120.2	23.49	6.40	3.39
LSD $_{0.05}$	2.65	0.23	7.17	0.49	1.01	0.38	0.10

Results in Table (4) revealed that nitrogen fertilizer rates had a significantly effect on N, P and K % of rice and *Cyperus difformis* L. plants at 60, and 80 DAS, except P % in rice plants at 80 60 DAS in the first season. In the second season both N and P contents in rice at 80 and 60 DAS, respectively, and P in *Cyperus difformis* L. at 60 DAS was not significantly affected due to the tested N-rates. Increasing nitrogen fertilizer from 50 to 80 or 90 kg N fed^{-1} rates seemed to increase N, P and K % of rice and *Cyperus difformis* L. plants at 60 and 80 DAS in both seasons, respectively.

3.1.4.N, P and K concentrations and nutrients uptake in rice grains:

Significant increases in N, P and K uptake in rice grain were noticed by increasing nitrogen fertilizer rate to 70 or 90 kg N fed^{-1}, Table (5) which resulted in increases amounted to (22.22 and 35.55%), (18.76 and 54.64%) and (59.51and 72.82%) in the first season and to (23.86 and 32.22%), (24.74 and 48.41%) and (23.07and 46.43%) in the second season, respectively, compared to 50 kg N fed^{-1}. Furthermore, grain protein% was not significantly affected by nitrogen fertilizer treatments in the first season, however, higher figures were noticed with higher N rates. Significant effect was exerted to alter protein% in the second season, and higher values still exhibited with higher N rate.

3.2. Effect of small-flower umbrella (*Cyperus difformis* L.) densities.

3.2.1. Fresh and dry weight of rice plants:

Data in Table (6) indicate that the adopted densities of *Cyperus difformis, L.* had significant effects on fresh and dry weight of rice plants at 70 or 90 DAS in both seasons. The densities of 10, 20, 40, 80 and 100 plants m^{-2} reduced fresh weight of rice plants by 9.07, 18.58, 32.21, 44.76 and 73.17 % and reduced dry weight of rice plants by 7.8, 16.4, 51.84, 73.28 and 85.94 % at 70 DAS, respectively, compared to Zero density in the first season. At 90 DAS reduction in rice fresh weight were 11.59, 20.47, 25.86, 44.84 and 71.81%. Whereas the reduction values in rice dry matter were 12.87, 23.94, 50.72, 67.98 and 78.29 %, respectively, in the first

Table (4): Effect of N-fertilizer rates on nutrients concentration of rice and small-flower umbrella, *Cyperus difformis,* L. plants at 60 and 80 DAS in 2015 and 2016 seasons.

N-fertilizer rates (Kg N fed^{-1})	Nitrogen %				Phosphorus %				Potassium %			
	Rice		*C. difformis*		Rice		*C. difformis*		Rice		*C. difformis*	
	Days after sowing, DAS											
	60	80	60	80	60	80	60	80	60	80	60	80
2015 season												
50	2.25	1.27	2.96	1.53	0.162	0.090	0.142	0.089	2.93	1.65	2.75	1.78
70	3.26	1.36	3.36	1.67	0.173	0.101	0.150	0.105	3.18	1.79	2.87	1.88
90	3.48	1.45	3.93	1.88	0.182	0.129	0.157	0.110	3.34	1.87	3.08	1.93
LSD $_{0.05}$	0.30	0.15	0.21	0.20	NS	0.04	0.03	0.03	0.18	0.06	0.28	0.08
2016 season												
50	2.34	1.19	2.83	1.43	0.153	0.085	0.134	0.080	2.87	1.62	2.54	1.68
70	3.17	1.24	3.25	1.53	0.164	0.091	0.136	0.084	3.11	1.66	2.80	1.77
90	3.31	1.31	3.88	1.68	0.169	0.126	0.141	0.095	3.29	1.69	3.11	1.85
LSD $_{0.05}$	0.10	NS	0.13	0.08	NS	0.01	NS	0.01	0.13	0.05	0.24	0.04

NS = nonsignificant at 0.05 level

Table (5): Effect of N- fertilizer rates on nutrient concentration and uptake by grain rice in 2015 and 2016 seasons.

N fertilizer rates (Kg fed^{-1})	Nutrient %			Nutrient uptake (kg fed^{-1})			Protein %
	N	P	K	N	P	K	
	2015 season						
50	1.87	0.306	0.302	55.35	9.06	8.94	10.66
70	2.05	0.326	0.432	67.65	10.76	14.26	11.69
90	2.11	0.398	0.439	73.92	14.01	15.45	12.03
LSD $_{0.05}$	NS	0.01	0.01	2.36	0.30	0.13	NS
	2016 season						
50	1.97	0.363	0.368	56.15	10.35	10.49	11.22
70	2.16	0.401	0.401	69.55	12.91	12.91	12.29
90	2.19	0.453	0.453	74.24	15.36	15.36	12.48
LSD $_{0.05}$	0.19	0.05	0.05	1.56	1.38	1.82	0.10

NS = nonsignificant at 0.05 level

Table (6): Effect of small-flower umbrella ,*Cyperus difformis,* L. densities on fresh and dry weight(g) of rice plants in 2015 and 2016 seasons.

Cyperus difformis L. densities (plant m^{-2})	2015 season				2016 season			
	Fresh weight (g)		Dry weight (g)		Fresh weight (g)		Dry weight (g)	
	Days After Sowing, DAS							
	70	90	70	90	70	90	70	90
Zero	184.1	317.5	26.68	58.65	191.9	347.3	28.11	55.14
10	167.4	280.7	22.40	51.10	176.8	290.2	21.37	46.84
20	149.9	252.5	22.40	44.61	158.3	247.3	18.58	37.89
40	124.8	235.4	12.85	28.90	137.5	226.8	14.53	31.68
80	101.7	175.2	7.13	18.78	108.9	181.1	7.80	21.59
100	49.4	89.5	3.75	12.73	55.4	95.5	4.03	16.29
LSD $_{0.05}$	25.60	47.30	1.68	3.99	25.47	46.83	1.81	4.09

season compared to Zero density, in the same order of the abovementioned weed densities. The same trend was obtained in the second season with slight differences. The reduction in fresh and dry weight of rice plants with increasing *Cyperus difformis* L. plant density may be attributed to competition due to high ability of this weed to absorb nutrients and increased vegetative growth.

3.2.2. Rice yield and yield components:

Data in Table (7) show that plant height (cm), panicle length (cm), No. panicles m^{-2}, No. full grain / panicles, 1000 grain weight (g), grain yield (ton fed^{-1}) and straw yields (ton fed^{-1}) were significantly affected by *Cyperus difformis* L. densities m^{-2} in both seasons. These parameters were progressively reduced by increasing *Cyperus difformis* L. density during the two growing seasons. The highest *Cyperus difformis,* L. density (100 plants m^{-2}) induced the highest reduction in plant height, panicle length, No. panicle m^{-2}, No. full grain $panicle^{-1}$, 1000 - grain weight and straw yield, which comprised (25.7 and 28.7 %), (19.8 and 19.7 %), (69.9 and 73.9 %), (59.94 and 63.22 %),(16.6 and 16.7 %) and (44.2 and 48.2 %), respectively, in the first and second seasons, compared with weed free treatment.

Furthermore, increasing *Cyperus difformis* L. density led to decreasing rice grain yield, where densities of 10, 20, 40, 80, and 100 *Cyperus difformis* L. plants m^{-2} reduced the grain yield by 5.37, 14.42, 22.24, 32.03 and 47.43 % as compared to zero density, respectively. Similar trend was obtained in the second season, since the abovementioned *Cyperus difformis* L. densities resulted in decreased rice grain yield values amounted to 7.98, 14.96, 22.94, 32.92 and 48.88 %, respectively, comparable with zero density. Such reductions may be due to the decrease in yield components e.g. plant height, panicle length, No. panicle m^{-2}, No. full grain $panicle^{-1}$, and 1000 grains weight. These results are in harmony with those obtained by Singh *et al.* (2007), Mamun *et al.* (2013) and Sheeja *et al.* (2013).

3.2.3. NPK concentration of rice and *Cyperus difformis* L. plants.

Data in Table (8) showed that the adopted *Cyperus difformis* L. densities significantly affected N, P and K % of rice and *Cyperus difformis* L. plants at 60 and 80 DAS in both seasons, except P % in both rice and *Cyperus difformis* L. plants at 60 DAS in the first season. The highest values of N, P and K % in rice plants at 60 and 80 DAS were observed from weed free treatment, whereas the lowest values were obtained from density of 100 *Cyperus difformis* L. plants m^{-2} in both seasons. While, the maximum N, P and K% in *Cyperus difformis* L. at 60 and 80 DAS were obtained from density of 10 *Cyperus difformis* L. plants m^{-2} and the lowest values were observed from density of 100 *Cyperus difformis* L. plants m^{-2} in both seasons. Similar results were obtained by Seema and Tohi (2010).

Table (7): Effect of small-flower umbrella ,*Cyperus difformis*, L. densities on rice yield and its components in 2015 and 2016 seasons.

Cyperus difformis L. densities (plant m^{-2})	Plant height (cm)	Panicle length (cm)	No. panicles m^{-2}	No. full grain $panicle^{-1}$	1000-grain weight (g)	Straw yield (ton fed^{-1})	Grain Yield (ton fed^{-1})
	2015 season						
Zero	105.03	25.12	205.08	131.67	24.69	7.40	4.09
10	101.36	24.70	186.67	126.08	23.60	7.09	3.87
20	97.12	24.28	167.25	116.08	22.73	6.61	3.50
40	91.69	23.53	126.08	107.42	22.19	5.95	3.18
80	86.54	22.52	88.33	72.9	21.20	5.32	2.78
100	78.08	20.15	61.67	52.75	20.60	4.13	2.15
$LSD_{0.05}$	1.84	0.15	9.19	1.89	0.58	0.23	0.05
	2016 season						
Zero	98.40	24.51	202.50	133.67	24.60	7.08	4.01
10	94.54	24.15	184.58	127.67	23.49	6.86	3.69
20	90.24	23.69	165.25	117.67	22.63	6.29	3.41
40	84.58	22.95	116.17	109.33	22.09	5.71	3.09
80	79.68	22.00	86.75	69.00	21.08	5.00	2.69
100	70.13	19.67	52.92	49.17	20.50	3.67	2.05
$LSD_{0.05}$	3.34	0.59	9.57	3.33	0.60	0.37	0.12

Table (8): Effect of *(Cyperus difformis* L.) density m^{-2} on nutrient concentration in rice and small-flower umbrella, *(Cyperus difformis* L.) plants at 60 and 80 DAS in 2015 and 2016 seasons

Cyperus difformis L. Densities m^{-2}	Nitrogen %				Phosphorus %				Potassium %			
	Rice		*C. difformis*		Rice		*C. difformis*		Rice		*C. difformis*	
	Days after sowing, DAS											
	60	80	60	80	60	80	60	80	60	80	60	80
	2015 season											
zero	3.61	1.75	-	-	0.20	0.15	-	-	3.73	2.21	-	-
10	3.42	1.46	3.87	2.13	0.19	0.13	0.16	0.13	3.52	1.92	3.49	2.09
20	3.19	1.38	3.56	1.94	0.17	0.11	0.15	0.11	3.33	1.75	3.13	1.98
40	2.88	1.29	3.39	1.66	0.16	0.10	0.14	0.10	3.21	1.64	3.06	1.79
80	2.63	1.07	3.11	1.50	0.15	0.09	0.14	0.08	2.97	1.56	2.81	1.61
100	2.44	1.00	2.77	1.21	0.14	0.08	0.13	0.07	2.83	1.41	2.45	1.47
LSD $_{0.05}$	**0.11**	**0.15**	**0.18**	**0.11**	**NS**	**0.01**	**NS**	**0.01**	**0.12**	**0.07**	**0.21**	**0.12**
	2016 season											
zero	3.50	1.69	-	-	0.19	0.14	-	-	3.57	2.04	-	-
10	3.33	1.36	3.86	2.06	0.18	0.12	0.16	0.12	3.36	1.84	3.59	2.14
20	3.11	1.25	3.64	1.81	0.17	0.10	0.14	0.09	3.25	1.66	3.03	1.93
40	2.76	1.17	3.42	1.44	0.16	0.09	0.14	0.08	3.04	1.56	2.80	1.73
80	2.56	1.00	3.03	1.31	0.14	0.08	0.13	0.07	3.84	1.51	2.51	1.58
100	2.36	1.00	2.67	1.14	0.14	0.07	0.12	0.07	2.84	1.35	2.15	1.42
LSD $_{0.05}$	**0.10**	**0.13**	**0.15**	**0.09**	**0.01**	**0.01**	**0.01**	**0.01**	**0.12**	**0.06**	**0.19**	**0.07**

NS = non-significant

3.2.4. NPK concentration and uptake in rice grains

As shown in Table (9) N, P and K percentages or uptake as well as grain protein percentage were reduced by increasing *Cyperus difformis* L. denisty. The highest density 100 *Cyperus difformis* L. plants m^{-2} recorded the highest reduction values of nutrient%, where the reduction were 17.37, 33.49 and 18.90 % for N, P and K %, respectively, compared with weed free treatment in the first season and by 8.84, 21.22 and 27.26 %, respectively, in the second season. N, P and K uptake values exhibited similar trend, and comprised 56.57, 65.06 and 57.41 %, respectively, in the first season and, 53.40, 59.74 and 62.81 %, respectively, in the second season. Likely, protein content of rice grain took the same trend, since the highest Cyperus difformis, L. density (100 plants m^{-2}) reduced it by 17.38 and 8.89 % in the first and second seasons, respectively compared with zero Cyperus difformis, L. plants m-2. These results suggest that Cyperus difformis, L. strongly competed with rice crop for N, P and K nutrients in particular with nitrogen. Similar results were obtained by Singh *et al.* (2009).

3.3. Effect of interaction between nitrogen fertilizer and (*Cyperus difformi* L.) densities

3.3.1. Fresh and dry weight of rice plants:

Data in Table (10) revealed that all interaction between nitrogen fertilizer and *Cyperus difformis* L. densities had statistically significant effect on rice fresh and dry weight at 70 and 90 DAS. The maximum fresh and dry weight of rice plant at 70 and 90 DAS were 186.8 and 432.6 g and 34.4 and 59.6 g, respectively, were recorded from weed free treatment as interacted with 90 kg N fed^{-1} rate, whereas, the minimum values of fresh and dry weight at 70 DAS (178.8 and 27.7 g) and at 90 DAS (293.9 and 56.4g) were observed from interaction of 100 *Cyperus difformis*, L. plants m^{-2} treatment and 50 kg N fed^{-1} rate, respectively in the first season. The same trend was obtained in the second season with slight differences.

3.3.2. Yield and yield components:

Data in Table (11) show that all interaction between nitrogen fertilizer and *Cyperus difformis* L. densities had statistically significant effect on all of the studied parameters of grain

Table (9): Effect of small-flower umbrella, *Cyperus difformis* densities m^{-2} on nutrient concentration and Uptake by grain rice in 2015 and 2016 seasons .

Cyperus difformis densities m^{-2}	Nutrient content %			Nutrient uptake (kg fed^{-1})			Protein %
	N	P	K	N	P	K	
	2015 season						
zero	2.13	0.415	0.439	87.12	16.97	17.96	12.14
10	2.11	0.382	0.411	81.66	14.78	15.91	11.97
20	2.07	0.359	0.390	72.45	12.57	13.65	11.80
40	2.03	0.320	0.379	64.55	10.18	12.05	11.57
80	1.94	0.309	0.369	53.93	8.59	10.26	11.06
100	1.76	0.276	0.356	37.84	5.93	7.65	10.03
$LSD_{0.05}$	0.23	0.02	0.01	2.87	0.51	0.37	1.31
	2016 season						
zero	2.15	0.443	0.521	86.22	17.76	20.89	12.26
10	2.10	0.468	0.454	77.49	17.27	16.75	12.09
20	2.09	0.409	0.476	71.27	13.95	16.23	11.91
40	2.04	0.395	0.428	63.04	12.21	13.23	11.63
80	2.00	0.369	0.415	53.80	9.93	11.16	11.40
100	1.96	0.349	0.379	40.18	7.15	7.77	11.17
$LSD_{0.05}$	0.23	0.05	0.08	1.09	1.40	2.24	0.11

Table (10): Effect of interaction between N-fertilizer rates and small-flower umbrella, (*Cyperus difformis* L.) densities on fresh and dry weight (g) of rice plants in 2015 and 2016 seasons.

N Fertilizer rates (kg N fed^{-1})	*(Cyperus difformis)* densities	2015 season				2016 season			
		Fresh weight (g)		Dry weight (g)		Fresh weight (g)		Dry weight (g)	
		Days after sowing, DAS							
		70	90	70	90	70	90	70	90
50	Zero	178.8	293.9	27.7	56.4	183.8	304.3	29.3	58.6
	10	173.5	252.5	23.8	46.6	170.7	262.9	24.2	48.7
	20	149.0	235.0	20.0	37.7	153.8	241.9	21.1	39.8
	40	127.6	154.4	14.0	32.6	132.6	160.0	16.5	32.7
	80	67.4	96.8	10.1	21.6	73.4	102.4	11.4	22.7
	100	32.8	68.8	7.7	16.1	37.8	75.1	9.8	17.2
70	Zero	1838	379.8	32.9	59.9	197.5	389.0	34.2	59.1
	10	176.9	280.1	27.6	49.0	189.3	381.7	29.1	47.5
	20	138.5	253.4	21.7	38.9	165.5	254.1	23.7	41.0
	40	120.0	231.0	18.5	32.1	110.8	233.3	18.2	33.6
	80	111.3	114.0	12.8	26.5	79.0	169.8	12.7	27.3
	100	50.3	92.5	9.2	18.0	59.5	98.4	10.6	19.4
90	Zero	186.8	432.6	34.4	59.6	199.3	348.8	35.8	59.9
	10	164.5	383.5	29.8	47.3	168.3	393.0	29.9	48.6
	20	146.3	389.0	25.5	40.2	145.5	279.3	26.9	42.4
	40	121.8	167.1	20.1	35.0	123.3	153.0	21.9	35.1
	80	112.5	132.8	13.5	26.3	114.3	121.3	14.4	28.2
	100	65.3	101.1	9.4	19.1	69.0	113.0	10.8	19.8

yield and its components, and such results were true in the first and second seasons. The highest value of plant height (107.98 and 102.18 cm), panicle length (25.57 and 24.77cm),number panicles m^{-2} (218.50 and 216.25), number full grain $panicle^{-1}$ (138.25 and 140.00),1000-grain weight (25.57 and 25.47 g),straw(7.88 and 7.56 ton fed^{-1})and grain yield(4.21and 4.15ton fed^{-1}), respectively, in the first and second seasons were obtained from adding 90 kg N/fed. In the absence of (*Cyperus difformis* L.) competition.

On the other hand, the lowest values of the abovementioned parameters, in the first and second seasons were (69.73 and 60.35 cm),

Table (11): Effect of interaction between N- fertilizer rates and small-flower umbrella,*Cyperus difformis L.* densities on rice grain yield and its components in 2015 and 2016 seasons.

N- nitrogen rates (kg N fed^{-1})	*(Cyperus difformis)* densities	Plant height (cm)	Panicle length (cm)	No. Panicles m^{-2}	No. full grain $panicle^{-1}$	1000-grain Weight (g)	Straw yield (ton fed^{-1})	Grain yield (ton fed^{-1})
		2015 season						
50	**Zero**	101.80	24.70	190.00	122.50	23.65	6.84	3.95
	10	98.00	24.28	164.00	117.50	22.56	6.17	3.68
	20	95.10	23.93	147.50	108.25	21.52	5.70	3.09
	40	87.73	22.69	121.50	99.75	20.81	4.88	2.80
	80	81.68	20.93	60.00	94.25	19.87	4.37	2.39
	100	69.73	18.81	42.25	85.75	19.00	3.18	1.84
70	**Zero**	105.33	25.08	206.75	134.25	24.85	7.51	4.10
	10	101.35	24.69	191.50	129.00	23.73	7.24	3.89
	20	96.05	24.19	163.75	118.75	22.87	6.85	3.55
	40	91.83	23.73	115.50	110.25	22.39	6.18	3.25
	80	86.53	23.03	91.75	104.50	21.31	5.59	2.87
	100	77.55	20.33	65.00	94.25	20.88	4.46	2.17
90	**Zero**	107.98	25.57	218.50	138.25	25.57	7.88	4.21
	10	104.73	25.15	204.50	131.75	24.52	7.57	4.03
	20	100.20	24.74	190.50	121.25	23.82	7.18	3.86
	40	95.53	24.18	141.25	112.25	23.37	6.79	3.49
	80	91.43	23.60	113.25	107.50	22.40	5.98	3.09
	100	86.98	21.30	77.75	98.25	21.93	4.76	2.43
LSD $_{0.05}$		3.19	0.26	16.1	NS	NS	0.40	0.08
		2016 season						
50	**Zero**	94.80	24.24	187.75	124.50	23.58	6.55	3.84
	10	91.33	23.83	162.25	118.75	22.44	5.87	3.57
	20	87.95	23.38	145.25	109.50	21.43	5.39	2.99
	40	80.53	22.18	95.25	101.00	20.71	4.83	2.69
	80	75.10	20.50	58.50	95.75	19.77	4.07	2.30
	100	60.35	18.35	36.00	88.00	18.91	2.96	1.71
70	**Zero**	98.23	24.51	203.50	136.50	24.75	7.16	4.03
	10	93.88	24.16	189.00	130.75	23.62	6.89	3.81
	20	88.73	23.69	162.25	120.00	22.75	6.52	3.46
	40	84.45	23.19	114.00	112.50	22.29	5.86	3.16
	80	79.53	22.51	90.00	106.75	21.20	5.27	2.78
	100	69.85	19.78	46.75	97.50	20.77	4.13	2.10
90	**Zero**	102.18	24.77	216.25	140.00	25.47	7.56	4.15
	10	98.43	24.45	202.50	133.50	24.41	7.32	3.94
	20	94.05	24.00	188.25	123.50	23.72	6.96	3.77
	40	88.78	23.50	139.25	114.50	23.26	6.47	3.41
	80	84.40	22.98	111.75	109.50	22.28	5.66	2.99
	100	80.20	20.88	76.00	100.00	21.83	4.54	2.34
LSD $_{0.05}$		**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**0.20**

(18.81 and 18.35 cm), (42.25 and 36.00), (85.75 and 88.00), (19.00 and 18.91 g), (3.18 and 2.96 ton fed^{-1}), (1.84 and 1.71 ton fed^{-1}) in the same order of the tested parameters, respectively obtained from adding 50 kg N/fed. under natural infestation of *(Cyperus difformis* L*)* (about 100 plant/m^2). Similar results were obtained by Abou- khalifa *et al.*, (2005) and Abdalla and Abou-Khalifa (2012).

3.4.Prediction of rice grain yield losses/ fed due to *Cyperus difformis* L. competition

Data in Table (12) and Fig. (1 and 2) Showed that increasing *(Cyperus difformis* L.) densities caused a significant reduction in grain yield (ton fed^{-1}). also, it was clear that the suitable mathematical model which filled for prediction rice grain yield (ton fed^{-1}) losses was

Table (12): Effect of interaction between N- fertilizer rates and small-flower umbrella, (*Cyperus difformis* L.) densities on observed and predicted yield and yield losses of broadcast rice in 2015 and 2016 seasons.

Fertilizer nitrogen rates (kg fed^{-1})	*Cyperus difformis* densities plant m^{-2}	2015 season			2016 season		
		Observed grain yield (ton fed^{-1})	Predicted grain yield (ton fed^{-1})	% Yield losses	Observed grain yield (ton fed^{-1})	Predicted grain yield (ton fed^{-1})	% Yield losses
50	Zero	3.95	3.96	0	3.84	3.86	0.00
	10	3.68	3.58	6.83	3.57	3.47	7.03
	20	3.09	3.25	21.77	2.99	3.14	22.14
	40	2.8	2.77	29.11	2.69	2.66	29.95
	80	2.39	2.53	39.49	2.3	2.42	40.10
70	Zero	4.1	4.11	0	4.03	4.04	0.00
	10	3.89	3.86	5.12	3.81	3.77	5.46
	20	3.55	3.66	13.42	3.46	3.53	14.14
	40	3.25	3.36	20.73	3.16	3.18	21.59
	80	2.87	3.25	30	2.78	2.97	31.02
90	Zero	4.21	4.23	0	4.15	4.15	0.00
	10	4.03	4.02	4.28	3.94	3.94	5.06
	20	3.86	3.84	8.31	3.77	3.75	9.16
	40	3.49	3.53	17.1	3.41	3.43	17.83
	80	3.09	3.15	26.6	2.99	3.03	27.95
LSD $_{0.05}$		0.08	-	-	0.20	-	-

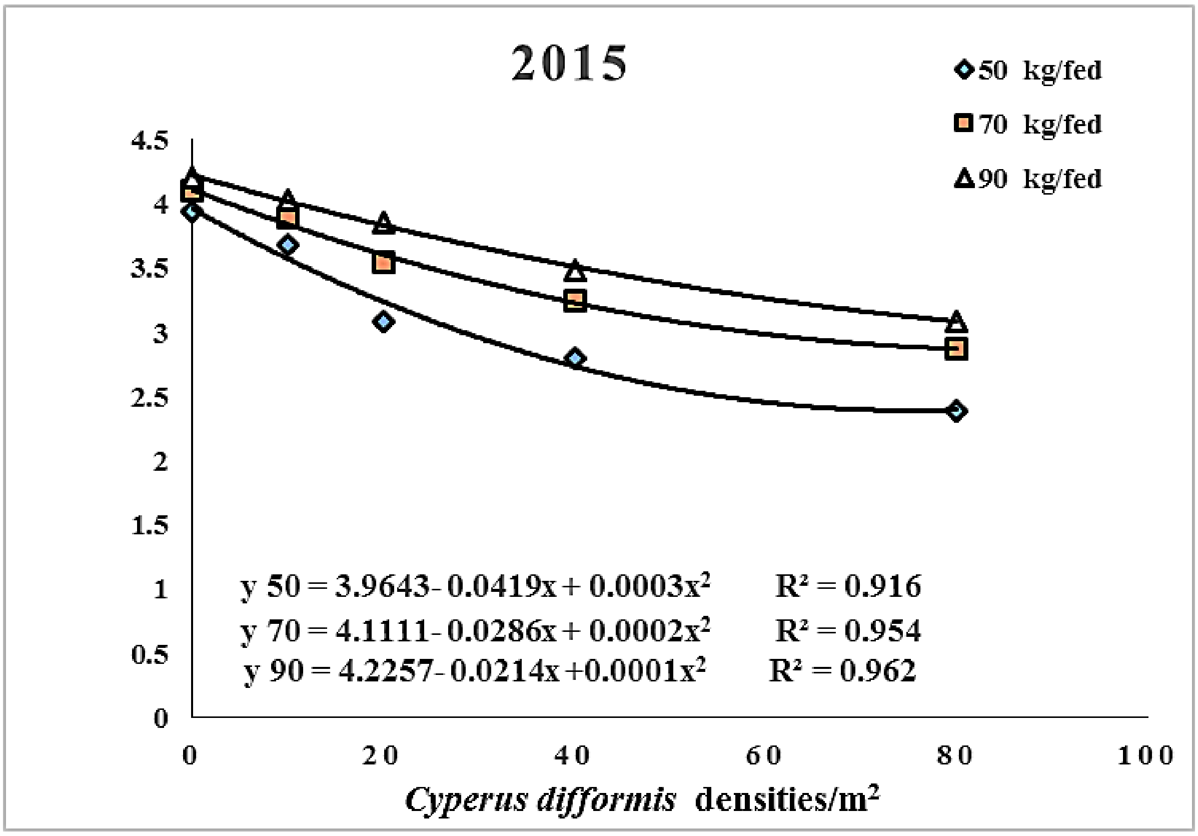

Fig. (1): Relationship between small-flower umbrella, Cyperus difformis, L. densities plants m^{-2} and rice grain yield (ton fed^{-1}) under three nitrogen fertilizer rates 50, 70 and 90 kg N fed^{-1} in 2015 season.

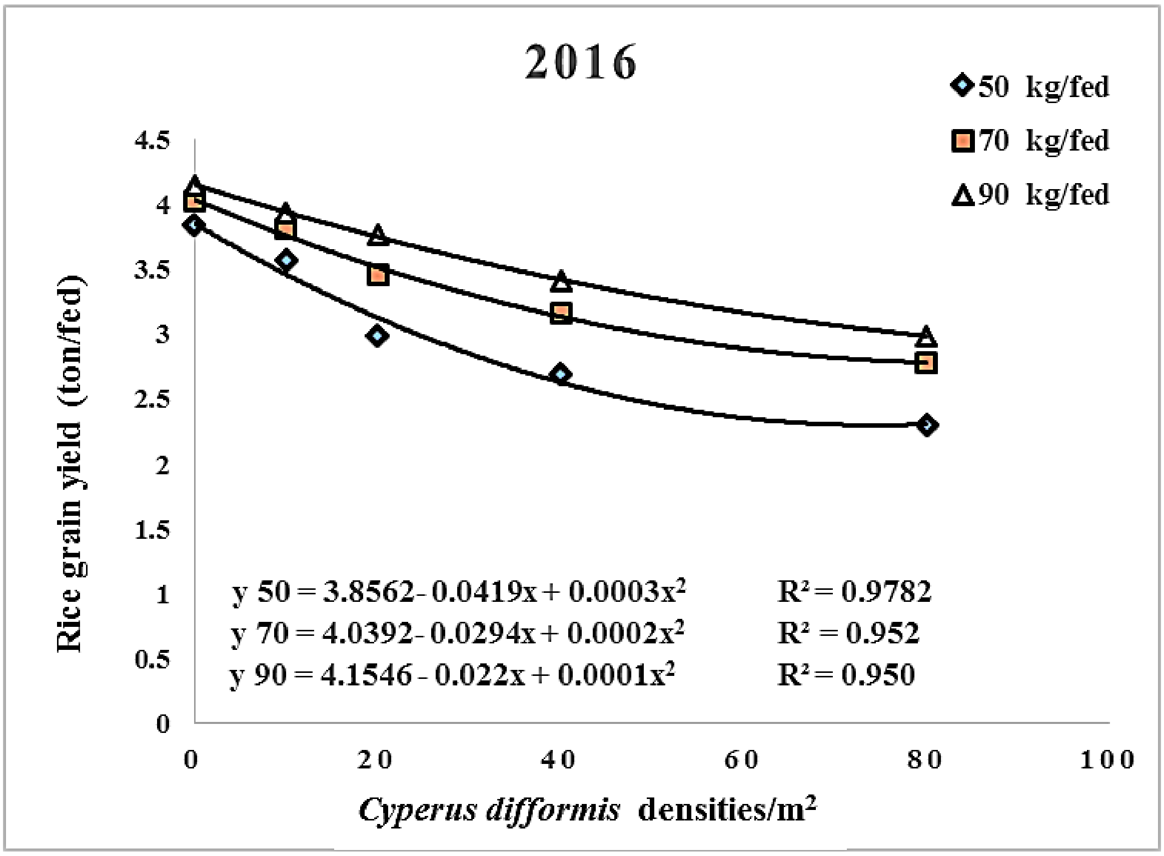

Fig.(2): Relationship between small-flower umbrella, *Cyperus difformis* L. dinisities plants m^{-2} and rice grain yield (ton/ fed.) under three nitrogen fertilizer rats 50,70 and 90

a quadratic function because the correlation coefficient (R^2) was greater than other studied models and standard estimate error (SE) were smaller than those of the other studied where polynomial models: Ý= 3.9643 - 0.0419x + $0.0003x^2$ R^2 = 0.916, Ý = 4.1111 - 0.0286x + $0.0002x^2$ R^2 = 0.954 and Ý= 4.2257- 0.0214x + $0.0001x^2$ R^2 = 0.962 due to the increasing Cyperus difformis L. densities from zero to 80 plants m^{-2} under N_{50}, N_{70} and N_{90}, respectively in the first season and Ý = 3.856 - 0.0419 x + 0.0003 x^2 R^2 = 0.9782 , Ý = 4.0392 - 0.0294 x + 0.0002 x^2 R^2 = 0.952 and Ý = 4.1546 - 0.022 x + 0.0001 x^2 R^2 = 0.950 under N_{50}, N_{70} and N_{90}, respectively in the second season. Also, data showed that rice yield losses % was increased by increasing nitrogen fertilizer levels from N_{50} to N_{90} and *Cyperus difformis* L. density from zero up to 80 *Cyperus difformis* L. plants m^{-2} in both seasons. It is clearly indicated from the Fig. (1) Rice crop don't compete at higher levels of nitrogen fertilizer and *Cyperus difformis* L. densities and there is a drastic decline in grain yield.

3.5.Correlation between all studied characters and rice grain yield

Data presented in Table (13) indicated that dry weight (g) small-flower umbrella *(Cyperus difformis* L.) plants were negatively and highly significantly correlated with plant height,panicle length, number of panicle m^{-2}, number of full grain $panicle^{-1}$, 1000-grain weight, straw yield and grain yield (ton fed^{-1}) in both seasons. While, grain yield (ton fed^{-1}) was positively and highly significantly correlated with plant height, panicle length, number of panicle m^{-2}, number of full grain $panicle^{-1}$, 1000-grain weight and straw yield (ton fed^{-1}) in both seasons. Suggesting that rice grain yield can be affected strongly by (*Cyperus difformis* L.) competition, and need suitable control program for this weed species to increase rice productivity per unit area broadcasted planting method.

Table (13): Correlation coefficient between morphological yield and its components traits in 2015 and 2016 seasons.

Characters	Fresh weight (g)	plant height (cm)	Panicle length (cm)	No. panicle m^{-2}	No. of full grain $panicle^{-1}$	1000-grain weight (g)	Straw yield (ton fed^{-1})	Grain yield (ton fed^{-1})
2015 Season								
Dry weight (g)	0.989**	-0.796**	-0.840**	-0.835**	-0779**	-0.606**	-0.848**	-0.773**
plant height (cm)			0.936**	0.954**	0.943**	0.880**	0.933**	0.941**
Panicle length (cm)				0.919**	0.908**	0.789**	0.961**	0.937**
No. panicle m^{-2}					0.960**	0.870**	0.951**	0.949**
No. of full grain $panicle^{-1}$						0.879**	0.947**	0.960**
1000-grain weight (g)							0.802**	0.903**
Straw yield (ton/fed)								0.946**
2016 Season								
Dry weight (g)	0.988**	-0.779**	-0.823**	-0.838**	-0.771**	-0.605**	-0.836**	-0.790**
plant height (cm)			0.952**	0.937**	0.937**	0.929**	0.878**	0.937**
Panicle length (cm)				0.912**	0.913**	0.870**	0.888**	0.840**
No. panicle m^{-2}					0.955**	0.869**	0.937**	0.943**
No. of full grain $panicle^{-1}$						0.924**	0.909**	0.961**
1000-grain weight (g)							0.797**	0.915**
Straw yield (ton/fed)								0.916**

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تاثير معدلات السماد النيتروجيني ومنافسة حشيشة العجيرة علي امتصاص العناصر الغذائية وانتاجية الارز البدار

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ملخص

أجريت تجربتان حقليتان بمحطة البحوث الزراعية بالجميزة ، محافظة الغربية ، خلال موسمي الزراعة الصيفي 2015 و 2016 . كان الهدف من البحث هو دراسة تاثير مستويات التسميد النيتروجيني ومنافسة حشيشة العجيرة علي انتاجية الارز البدارو إمتصاص المغذيات. إشتملت كل تجربة علي ثمانية عشر معاملة تمثل التفاعل بين ثلاث مستويات من التسميد النيتروجيني وهي 50 ، 70 ، 90 كجم ف$^{-1}$ وسته كثافات من حشيشة العجيرة وهي صفر ،10 ، 20 ، 40 ، 80 ، 100 نبات م$^{-2}$ (الإصابة الطبيعية بالتربة). استخدم تصميم القطع المنشقه مرة واحدة في اربع مكررات. اظهرت النتائج أن زيادة معدلات التسميد النيتروجيني ادي الي زيادة معنوية في صفات النمو في الارز البدار والمحصول ومكوناته خلال موسمي الزراعة. حيث أدي مستوي التسميد النيتروجيني بمعدل 70 و 90 كجم ف$^{-1}$ الي زيادة محصول الحبوب بمقدار 11.45 و 18.91 % في الموسم الاول وبمقدار 12.92 و 18.92 % في الموسم الثاني ، علي التوالي ، مقارنة بمعدل التسميد المنخفض 50 كجم ف$^{-1}$. ايضا اثرت زيادة معدلات التسميد النيتروجيني معنويا علي النسبة المئوية للنيتروجين والفوسفور والبوتاسيوم لكل من نباتات الارز البدار وحشيشة العجيرة عند عمر 60 ، 80 يوم من الزراعة. فقد وجد ان النسبه المئويه للنيتروجين والفوسفور والبوتاسيوم انخفضت بنمو كلا من نباتات الارز البدار وحشيشة العجيرة. وكان تركيز النيتروجين في نباتات حشيشة العجيرة اعلي من نباتات الارز مما يدل علي القدرة العاليه لنباتات حشيشة العجيرة و أنها أعلي منافسة منه فى نباتات الارز البدار علي عنصر النيتروجين. علاوة علي ذلك اثرت زيادة معدلات التسميد النيتروجيني معنويا علي النسبه المئويه للنيتروجين والفوسفور والبوتاسيوم وامتصاص كلا منهم والنسبه المئويه للبروتين في حبوب الارز البدار،حيث ادت اضافة معدلات التسميد النيتروجيني 70 و 90 كجم ف$^{-1}$ الي زيادة النسبه المئويه للبروتين في حبوب الارز بمقدار 9.54 و 11.23 % في الموسم الثاني علي التوالي مقارنة بمعدل التسميد المنخفض (50 كجم ف$^{-1}$). علي العكس مما سبق ، أدت زيادة كثافة حشيشة العجيرة /م$^{-2}$ أدت إلى تأثير عكسي علي نمو نباتات الارز البدار والمحصول ومكوناته خلال موسمي الزراعة. زيادة عدد نباتات حشيشة العجيرة من 10 الي 100 نبات م$^{-2}$ نقص محصول الحبوب من 5.37 الي 47.43% في الموسم الاول ومن 7.98 الي 48.88 % في الموسم الثاني مقارنة بمعاملة العجيرة صفر. وقد سجلت كثافة العجيرة م$^{-2}$ تأثيرات معنوية ايجابية علي النسبه المئويه للنيتروجين والفوسفور والبوتاسيوم في كلا من نباتات الارز والعجيرة عند عمر 60 و 80 يوم من الزراعة، بالاضافة الي محتوي حبوب الارز من النيتروجين والفوسفور والبوتاسيوم والبروتين خلال موسمي الدراسة. أدت زيادة كثافة حشيشة العجيرة من 10 الي 100 نبات م$^{-2}$ الي نقص النسبه المئويه للبروتين في حبوب الارز البدار من 0.17 الي 2.11 % في الموسم الاول ومن 0.17 الي 1.09 % في الموسم الثاني مقارنة بكثافة العجيرة صفر. كما أعطي التفاعل بين معدل التسميد النيتروجين 90 كجم ف$^{-1}$ وكثافة نباتات العجيرة صفر م$^{-2}$ أعلي محصول حبوب (4.21 و 4.15 طن ف$^{-1}$) في الموسم الاول ، الثاني علي التوالي ، مقارنة بمعدل التسميد النيتروجيني 50 كجم ف$^{-1}$ وكثافة نباتات العجيرة 100 نبات م$^{-2}$ (1.84 و 1.71 طن ف$^{-1}$) في الموسم الاول والثاني علي التوالي. توصي هذه الدراسة بأنه يجب مكافحة حشيشة العجيرة لتجنب الخسارة في محصول الأرز البدار الناتجه من منافستها له من خلال التكامل بين التسميد النيتروجيني ومعاملات مكافحة الحشائش وذلك للحصول علي أعلي محصول حبوب من الارز البدار.

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