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Role of Allelopathy and Transplanting Space in Reducing Herbicide Use under Transplanted Rice (*Oryza sativa* L.)

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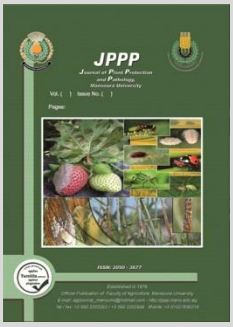

ABSTRACT

Two field experiments were carried out at the farm of Sakha Agric., Res., Station, Kafrelsheikh, Egypt, through 2018 & 2019 seasons to study the role of allelopathy and transplanting space in reducing herbicide use under transplanted rice (Sakha 106 cv). Rice seedlings were manually transplanted under three spaces included 15x20cm, 20x20cm and 25x20cm. Four weed control treatments included pre-mixed herbicide Pindar 13.6% OD (triclopyr-butotyl 12 % + penoxsulam 1.6%) was used at recommended and ½ recommended dose compared with hand weeding and weedy check. Narrow transplanting space recorded the best in controlling *E. crus-galli, C. difformis, Eclipta sp*., as well as total weeds. Besides, achieved the highest dry weight of rice; panicles m^{-2}; panicle weight and grain yield during both seasons. The highest dry weights of tested weeds and lowest values of rice characteristics were recorded under wider transplanting space throughout the tested seasons. Recommended rate of herbicide exceeded other weed control treatments in weeds control and produced highest dry matter and yield of Sakha 106 cv through both seasons. Recommended or half herbicide rate were the best in controlling weeds; dry weight of rice; grain yield and its attributes under 15 x 20 cm space without significant differences in the two seasons. It could be concluded that allelopathic rice cultivar Sakha 106 can be helpful in reducing herbicide use up to half dose when rice plants were transplanted on 15 x 20 cm.

Keywords: Allelopathy, Rice, Herbicide, dose and Weeds.

INTRODUCTION

Oryza sativa L. is one of main cereal crops all over the world, In Egypt, rice is playing an important role in human feeding, make a balance with sea water especially in salt belt zoon in Kafrelsheikh governorate to keep these soils able to produce economic yield and prevent desertification. FAOSTAT, 2017 reported that Egypt cultivated 685.908 hectares (1.632.461feddan) and produced 6.380.000 tons paddy rice by average productivity 9.302 tons/ha. (3.908 t/fed.).

Rice crop faces many stresses which negatively affect the productivity. One of the most serious stresses is weeds. Weed infestation led to increase rice inputs, production labors and decrease net-income of farmers from rice cultivation by adding more nutrients, water, herbicides to manage these weeds which decrease rice yield, quality and price in addition to it is play as a host for insects and diseases (Abd El-Naby *et al*., 2019). In transplanted rice weed flora is a mixture of grassy weeds, sedges and broad leaves. It must be control weeds to maximize rice production by early-post herbicides or late-post herbicides; it is high cost and environmental pollutions.

Molish (1937) described allelopathy as Allelon (of each other) and Pathy (to suffer). Allelopathy is a toxic effect of rice plants on weeds, in addition it is a result of releasing natural compounds called allelochemicals by roots, stem, leaves and seeds of plant called donor or source plant (Inderjit, 1996) then transform to another plant (target plant) by leaching, root exudation, volatilization and decomposition of plant residues in the soil (Chou, 1995 and Putnam and Tang, 1986). These allelochemicals prevent weed seeds germination or kill the germinated weed seedling. Romeo (2000) described allelopathy as phytotoxic interference by adding bio chemicals to the ecosystem.

Chemical weed control is the reliable way in weed control and increase rice production. It leads to add more herbicides to control grassy weeds, sedges and broadleaves resulting in increasing production cost and environmental pollution. Reducing herbicides use in rice cultivation can be achieved by breeding and cultivating allelopathic rice genotypes (Rice, 1995). Gealy *et al.,* (2003) reported that herbicide treated in yield rice cultivation able to reduce by exploiting allelopathic rice genotypes.

Transplanting spaces is an important factor in rice production to have the optimum plant density in unit area and produce high grain yield. Transplanting spaces are differed according to rice cultivar depending on tillering ability. Weed control in narrow transplanting spaces (10x20cm) is more effective than wide spaces (20x20cm) as a result of high competitive ability of rice cultivar against weeds in narrow spaces. Hassan, (1997) reported that weed biomass was decreased from about 20 to 45% when row spacing was reduced from 20x20 cm to 10x20cm in Giza 178 rice cultivar. Cultivating allelopathic rice genotype and transplanting rice on narrow space gradually decreased herbicides dosage by 50% and have the same level of weed control (Abd El-Razek *et al*., 2014).

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This work aims to study the ability of employment allelopathic rice cultivar Sakha 106 and transplanting spaces to reduce herbicide use under transplanted rice conditions.

MATERIALS AND METHODS

Two farm experiments were conducted at Sakha Agric., Res., Station, Kafrelsheikh, Egypt throughout two seasons 2018 & 2019 seasons to study the role of allelopathic rice cultivar Sakha 106 (Abd El-Naby, 2013) in reducing herbicides use by integration with transplanting spaces. The experimental design was split-plot with three replications through the two seasons, whereas, the main plots were devoted to transplanting spaces, while the treatments of weed control were allocated in sub-plots and plot area 15 m^2 during the tested seasons. Rest agricultural operations were applied based on recommendations of Rice Res., and Training Center (RRTC, 2017).

Studied factors:

A – Transplanting spaces:

Three transplanting spaces in manual transplanting of Sakha 106 were studied as follow:

1- 15 × 20 cm.
2- 20 × 20 cm.
3- 25 × 20 cm.

B - Weed control treatments:

Four weed control treatments were applied as follow:

1- Pindar 13.6% OD (triclopyr-butotyl 12% + penoxsulam 1.6%) at recommended dose (triclopyr-butotyl 257g ai ha^{-1} + penoxsulam 34.3g ai ha^{-1}) at 15 days after transplanting (DAT).
2- Pindar 13.6% OD (triclopyr-butotyl 12% + penoxsulam 1.6%) at half dose (triclopyr-butotyl 128.5g ai ha^{-1} + penoxsulam 17.2g ai ha^{-1}) at 15 DAT.
3- Hand weeding two times at 20 and 40 DAT.
4- Weedy check (un-treated).

Pindar 13.6% OD as pre-mixed herbicide was applied as spraying on wet land using Gloria sprayer as five liters capacity at 15 DAT after dissolved by water and applied in 300 liters water ha^{-1}. The field was flooded after 24 hrs. from application by herbicide and the field was flooded for three days after herbicidal application.

Data sources:

A– Measurements of weeds:

At 60 DAT, the weeds were sampled quadrate 50×50cm, and were replicated four times for each plot; weeds were cleaned; species classified; air dried and then oven dried on 70 ºC for 48 hrs. or to weight stable, then dry weight was determined as g m^{-2}.

B– Parameters of rice:

Dry weight of rice (g m^{-2}) was estimated at 60 DAT by the same method of weeds dry weight. Panicles m^{-2} number was estimated as average of 10 hills randomly in each plot, the converted into number per square meter. Before harvest, ten panicles were randomly sampled from each plot then weighed and panicle weight was calculated as average. Grain yield was determined from the central 5m^2 from every plot, then weighed and modified at moisture of 14% content, then, converted into tons per hectare.

Statistical analysis:

The collected data were exposed to proper statistical analysis of variance based on Snedecor and Cochran 1971. Weed data were transformed based on transformation of square-root ($\sqrt{[x+0.5]}$) and analyzed by MSTATC program. The rice data were analyzed by MSTATC program directly. Test of Duncan´s Multiple Range (Duncan, 1955) was used for comparison between the means.

RESULTS AND DISCUSSION

A- Weeds:

1- Dry weights of *E. crus-galli, C. difformis, Eclipta sp.* and total weeds as affected by transplanting space and weed control treatment during 2018 and 2019 seasons.

As shown from results in Table (1) that there were significant differences among transplanting spaces during both seasons of study.

Table 1. Dry weights of *E. crus-galli, C. difformis, Eclipta sp*. and total weeds as influenced by transplanting space and weed control treatment through 2018 and 2019 seasons. Weed transformed data are shown in parentheses.

Factor	Dry weight (g m^{-2})							
	E. crus-galli		*C. difformis*		*Eclipta sp.*		Total weeds	
	2018	2019	2018	2019	2018	2019	2018	2019
A- Transplanting space:								
1- (15 x 20 cm)	20.8(2.8 c)	13.9(2.7 c)	12.9(2.8 c)	33.8(4.0 c)	5.1(1.9 b)	4.7(1.6 b)	38.8(4.3 c)	52.4 (4.8 c)
2- (20 x 20 cm)	67.9(5.1 b)	52.9(4.7 b)	34.4(4.1 b)	42.6(4.6 b)	17.8(3.6 a)	18.9(3.5 a)	120.0(7.6 b)	114.4(7.5 b)
3- (25 x 20 cm)	114.9(6.7 a)	67.9(5.5 a)	96.0(6.8 a)	72.1(6.3 a)	19.5(3.8 a)	25.7(3.9 a)	230.4(10.3a)	165.7(9.2 a)
F. test	**	**	**	**	**	**	**	**
B- Weed control:								
1- Herbicide at recommended dose	0.0(0.7 c)	0.0(0.7 c)	0.0(0.7 d)	0.0(0.7 c)	0.0(0.7 d)	0.0(0.7 d)	0.0(0.7 d)	0.0(0.7 d)
2- Herbicide at half dose	2.5(1.6 b)	1.2(1.1 c)	3.9(1.8 c)	2.3(1.4 c)	6.0(2.3 c)	3.4(1.8 c)	12.3(3.1 c)	6.9(2.4 c)
3- Hand weeding	3.0(1.7 b)	9.1(3.1 b)	13.7(3.7 b)	24.3(4.8 b)	11.0(3.3 b)	7.2(2.4 b)	27.8(5.2 b)	40.6(6.2 b)
4- Weedy check	265.9(15.5a)	169.4(12.4 a)	173.4(12.2a)	171.3(13.0a)	39.4(6.1 a)	55.0 (7.2 a)	478.8(20.7 a)	395.7(19.4 a)
F. test	**	**	**	**	**	**	**	**
Interaction A * B	**	**	**	**	**	**	**	**

**** indicates P < 0.01. Means of transformed data followed by the same letter within a column are not significantly different at 5% level, using Duncan's Multiple Range Test (DMRT).**

Narrow space 15x20cm produced the lowest dry weights for studied weeds as well as total weeds dry weight in both seasons. While the highest dry weights of *Echinochloa crus-galli*, *Cyperus difformis* and total weeds were recorded in the wider transplanting space (25x20cm) during 2018 and 2019 seasons. For *Eclipta sp*., the highest dry weight was recorded under both of medium (20x20cm) and wider spaces (25x20cm) through both seasons. These results may be due to bio-chemicals released by roots, leaves and stem of Sakha 106 allelopathic rice cultivar into the environment and translocate to weed seeds by water leaching volatilization and inhibit weed seeds germination or kill the young seedlings of weeds, in addition to rapid coverage of rice plants to soil surface and obstruction of light penetration to the soil which reduce weed seeds emergence. Moreover, the high competitiveness ability of rice plants in narrow transplanting space against weeds as a result of high plant density and huge canopy which save growth demands like space, water, nutrients and light for rice plants and reduce losses. The results are in agreement with those mentioned by Hassan, (1997); Hassan *et al.*, (2010) and Abd El-Razek *et al.*, (2014). Ko *et al.*, (2005) reported that suppressive effective of allelopathic rice genotypes may be attributed to the released alkloides and essential oils which negatively affected weed seeds germination.

Concerning to weed control treatments, data in Table (1) indicated that herbicidal application at recommended dose exceeded other weed control treatments whereas it recorded the lowest dry biomass of *E. crus-galli, C. difformis, Eclipta sp*. and total weeds in 2018 and 2019 seasons with no significant differences between half dose of Pindar 13.6% for *E. crus-galli* and *C. difformis* in the second season. On the other hand, the highest dry weights for abovementioned weeds were recorded by weedy check plots during both seasons of study. The superiority of recommended dose of Pindar 13.6% OD reflect the high efficiency of this pre-mixed herbicide in managing and kill accompanied weeds in transplanted rice. These findings are confirmed with those obtained by Abd El-Naby (2013). Kong *et al.*, (2008) concluded that allelopathic rice genotypes had a great effect on weed control if integrated with cultural practices and application of low rates of herbicides. Willingham *et al.*, (2015) found that the application of penoxsulam + triclopyr at recommended doses recorded 87% weed control and scored the highest rice grain yield (9.32 t ha^{-1}).

2- Dry weights of *E. crus-galli* and *C. difformis* as affected by the interaction between transplanting space and weed control treatment during 2018 and 2019.

As shown from data in Table (2) that dry weights of both weeds were significantly influenced by transplanting space x weed control treatment in 2018 and 2019 seasons. The best control of *E. crus-galli and C. difformis* was achieved when Pindar 13.6% OD at recommended dose was applied at 15 DAT in plots transplanted on three studied spaces (15 x 20, 20 x 20 and 25 x 20 cm) without significant differences between the application of such herbicide at half dose in narrow transplanting space (15 x 20 cm) for both weeds in the two seasons of study. Plots treated with half dose of Pindar 13.6% OD and transplanted on 20 x 20 cm recorded the same results of dry weights of both weeds in the second season and for *C. difformis* in 2018 season. While the highest values of *E. crus-galli and C. difformis* dry weights were recorded by the combination of un-treated plots x Wider transplanting space (25 x 20 cm) in the two seasons of study. These findings might be as a result of the integration between allelopathic rice cultivar and transplanting space which led to reduce herbicide use and obtain a good weed control and save money to farmers and reduce environmental pollution caused by using huge amount of herbicides under rice cultivation system (Hassan *et al*., 1995 and Abd El-Naby, 2013). Lesnik (2003) found that optimum rice density may increase herbicide efficiency consequently effective weed control and help in reducing herbicide usage when cultivate allelopathic rice cultivar, in addition it keep environment from pollution.

Table 2. Dry weights of *E. crus-galli* and *C. difformis* as affected by interaction between transplanting spaces and weed control treatments on during 2018 and 2019 seasons.

Weed control	Dry weight of *Echinochloa crus-galli* (g m^{-2})					
	Transplanting space					
	15x20cm	**20x20 cm**	**25x20 cm**	**15x20cm**	**20x20cm**	**25x20cm**
	2018 season			**2019 season**		
1- Herbicide at recommended dose	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)
2- Herbicide at half Dose	0.0 (0.7 f)	2.1 (1.6 e)	5.3 (2.4 d)	0.0 (0.7 f)	0.0 (0.7 f)	3.5 (1.9 e)
3- Hand weeding	0.0 (0.7 f)	3.0 (1.9 de)	6.0 (2.5 d)	5.2 (2.4 e)	10.3 (3.3 d)	12.0 (3.5 d)
4- Weedy check	83.1 (9.1 c)	266.5 (16.3 b)	448.4 (21.2 a)	50.7 (7.1 c)	201.4 (14.2 b)	256.0 (16.0 a)
	Dry weight of *Cyperus difformis* (g m^{-2})					
	2018 season			2019 season		
1- Herbicide at recommended dose	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)	0.0 (0.7 f)
2- Herbicide at half Dose	0.4 (0.9 f)	1.2 (1.24 f)	10.1 (3.2 e)	0.0 (0.7 f)	0.9 (1.1 f)	6.1 (2.6 e)
3- Hand weeding	8.2 (2.9 e)	12.2 (3.5 e)	20.8 (4.6 d)	11.4 (3.4 de)	21.3 (4.5 d)	40.2 (6.3 c)
4- Weedy check	42.9 (6.6 c)	124.2 (11.1 b)	353.1 (18.7 a)	123.7 (11.1 b)	148.0 (12.2 b)	242.2 (15.6 a)

Means of transformed data for each weed within a season followed by the same letter are not significantly different at 5% level, using DMRT.

3- Effect of interaction between transplanting space and weed control treatment on dry weights of *Eclipta sp.* and total weeds in 2018 and 2019 seasons.

Dry weights of *Eclipta sp*. and total weeds were significantly influenced by the abovementioned interaction in 2018 and 2019 seasons as showed in Table (3). The results revealed that the lowest values of *Eclipta sp*. dry matter as well as total weeds dry weight were achieved by Pindar 13.6% OD at recommended dose under all transplanting spaces during two seasons of study with no significant differences between the half dose of certain herbicide under narrow transplanting space (15 x 20 cm) through 2018 and 2019 seasons, in addition to hand weeding under closer space (15 x 20 cm) for *Eclipta sp.* in the first season. While the heaviest dry weights of *Eclipta sp*. and total weeds were obtained by un-treated plots x wider space (25 x 20 cm) in the two seasons of study with no significant differences in weedy check plots transplanted on 20 x 20 cm space during 2018 season for *Eclipta sp*. These findings are in harmony with those cited in Rice in Egypt book, (2002) and Abd El-Razek *et al.*, (2014).

Table 3. Dry weights of *Eclipta sp*. and total weeds as influenced by interaction between transplanting spaces and weed control treatments during 2018 and 2019.

Weed control	Dry weight of *Eclipta sp.* (g m^{-2})					
	Transplanting space					
	15x20cm	20x20 cm	25x20 cm	15x20cm	20x20cm	25x20cm
	2018 season			2019 season		
1- Herbicide at recommended dose	0.0 (0.7 e)	0.0 (0.7 e)	0.0 (0.7 e)	0.0 (0.7 g)	0.0 (0.7 g)	0.0 (0.7 g)
2- Herbicide at half Dose	0.0 (0.7 e)	8.7 (3.0 c)	9.3 (3.1 c)	0.0 (0.7 g)	6.1 (2.5 ef)	4.1 (2.1 f)
3- Hand weeding	4.7 (2.3 d)	14.1 (3.8 b)	14.3 (3.8 b)	0.0 (0.7 g)	9.8 (3.1 de)	11.8 (3.5 d)
4- Weedy check	15.8 (4.0 b)	48.2 (7.0 a)	54.4 (7.4 a)	18.8 (4.4 c)	59.6 (7.7 b)	86.7 (9.3 a)
	Dry weight of total weeds (g m^{-2})					
	2018 season			2019 season		
1- Herbicide at recommended dose	0.0 (0.7 g)	0.0 (0.7 g)	0.0 (0.7 g)	0.0 (0.7 h)	0.0 (0.7 h)	0.0 (0.7 h)
2- Herbicide at half Dose	0.4 (0.9 g)	12.0 (3.5 f)	24.6 (5.0 e)	0.0 (0.7 h)	6.9 (2.7 g)	13.8 (3.8 f)
3- Hand weeding	12.9 (3.6 f)	29.3 (5.4 e)	41.1 (6.5 d)	16.6 (4.1 f)	41.4 (6.5 e)	64.0 (8.0 d)
4- Weedy check	141.8 (11.9 c)	438.8 (20.9 b)	855.9 (29.3 a)	193.2 (13.9 c)	409.0 (20.2 b)	584.9 (24.2 a)

Within a season for each weed, means of transformed data followed by the same letter are not significantly different at 5% level, using DMRT.

B- Rice parameters:

1- Effect of transplanting space and weed control treatment on dry weight, number of panicles m^{-2}, panicle weight and grain yield of Sakha 106 cv in 2018 and 2019 seasons.

As observed from data in Table (4) that transplanting spaces significantly affected rice dry matter and grain yield and it's studied attributes in both seasons. Except for panicle weight in the first season, narrow transplanting space (15 x 20 cm) recorded the highest values of rice dry weight, panicles m^{-2}, panicle weight and grain yield of Sakha 106 rice cultivar in both seasons with no significant differences between 20 x 20 cm transplanting space which scored the highest panicle weight in 2018 and 2019 seasons as well as number of panicles m^{-2} in the second season. While the lowest values of abovementioned rice characteristics were obtained by wider transplanting space (25 x 20 cm) through both seasons of study. These results may be due to strong vegetative growth of rice plants and coverage of rice canopy to the soil surface in narrow space which led to more benefits of water, nutrients, light and produce more dry matter, more panicles and high grain yield of rice. Similar results were found by Lesnik (2003) and Hassan *et al.*, (2010). Sunyob *et al.*, (2012) mentioned that closest spacing resulted in effective suppression for accompanied weeds with the highest rice grain yield.

For weed control treatments, data in Table (4) revealed that the application of Pindar 13.6% OD at recommended dose at 15 DAT exceeded rest weed control treatments and recorded the highest values of growth and yield of Sakha 106 rice cultivar during 2018 and 2019 seasons. On the other hand, the lowest dry weight, panicles m^{-2}, panicle weight and grain yield were scored in un-treated plots in both seasons of study. These results reflect chemical control efficiency of used herbicide in controlling grassy weeds, sedges and broadleaf weeds in transplanted rice which donate rice optimum growth conditions and produce high dry matter, panicles and higher grain yield (Willingham *et al.*, 2015 and Abd El-Naby *et al.*, 2019).

Table 4. Effect of transplanting space and weed control treatments on dry weight, number of panicles m^{-2}, panicle weight and grain yield of Sakha 106 rice cultivar during 2018 and 2019 seasons.

Factor	Rice dry weight (g m^{-2})		Number of panicles m^{-2}		Panicle weight (g)		Grain yield (t ha^{-1})	
	2018	2019	2018	2019	2018	2019	2018	2019
A- Transplanting space:								
1- (15 x 20 cm)	1018.9 a	1214.0 a	456.3 a	494.3 a	2.38 b	2.52 a	8.997 a	9.400 a
2- (20 x 20 cm)	879.6 b	1062.7 b	407.7 b	455.3 a	2.46 a	2.59 a	7.621 b	8.755 b
3- (25 x 20 cm)	835.4 c	854.4 c	336.8 c	359.0 b	2.34 c	2.41 b	6.862 c	7.418 c
F. test	**	**	**	**	**	**	**	**
B- Weed control:								
1- Herbicide at recommended dose	1069.4 a	1322.2 a	485.9 a	514.8 a	2.81 a	2.90 a	9.487 a	10.444 a
2- Herbicide at half dose	1026.4 b	1219.2 b	469.6 b	505.6 a	2.68 b	2.79 b	9.157 b	9.972 b
3- Hand weeding	955.5 c	1018.9 c	454.2 c	448.6 b	2.56 c	2.58 c	8.761 c	9.496 c
4- Weedy check	593.9 d	614.5 d	191.3 d	275.8 c	1.52 d	1.75 d	3.902 d	4.186 d
F. test	**	**	**	**	**	**	**	**
Interaction A * B	*	*	**	**	**	**	**	**

***, ** indicates P < 0.05 and P < 0.01, respectively. Means followed by the same letter within a column are not significantly different at 5% level, using DMRT.**

2- Effect of the interaction between transplanting space and weed control treatment on dry weight, number of panicles per unit area, panicle weight and grain yield of Sakha 106 cv. in 2018 and 2019 seasons.

Data in figures 1, 2, 3, and 4 revealed that narrow space (15 x 20 cm) x recommended or half dose of Pindar 13.6% OD at 15 DAT recorded the highest values of rice studied characteristics in both seasons of study.

On the other side, the lowest rice dry weight, panicles m^{-2}, panicle weight and grain yield of Sakha 106 were recorded by wider transplanting space in weedy check plots during 2018 and 2019 seasons. These results may be due to the high ability of Sakha 106 allelopathic rice cultivar on producing allelochemicals compounds inhibit or reduce weed germination and growth especially in narrow transplanting spaces which led to more vegetative growth, high yield and its attributes when treated with recommended or half dose of such herbicide in transplanted rice. Lesnik (2003) reported that optimum rice density may increase herbicide efficacy consequently effective weed control and helping reducing herbicides usage when cultivate allelopathic rice cultivar which to clean environment with less pollution. Abd El-Razek *et al*., (2014) found that Sakha 106 rice cultivar is high allelopathic potential against *E. crus-galli*. and *C. difformis* produced the highest rice dry matter, yield and its attributes when treated with herbicides at recommended or half dose under closer transplanting space (15 x 20 cm).

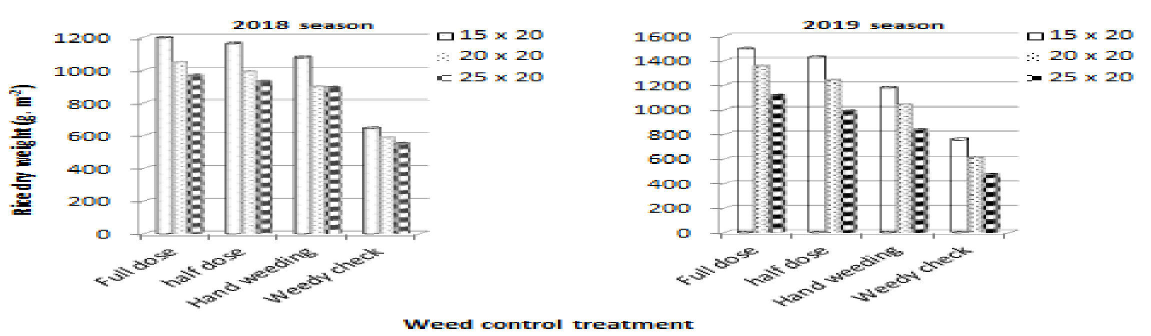

Fig. (1): Effect of interaction between transplanting space and weed control treatment on dry weight of rice in 2018 and 2019 seasons

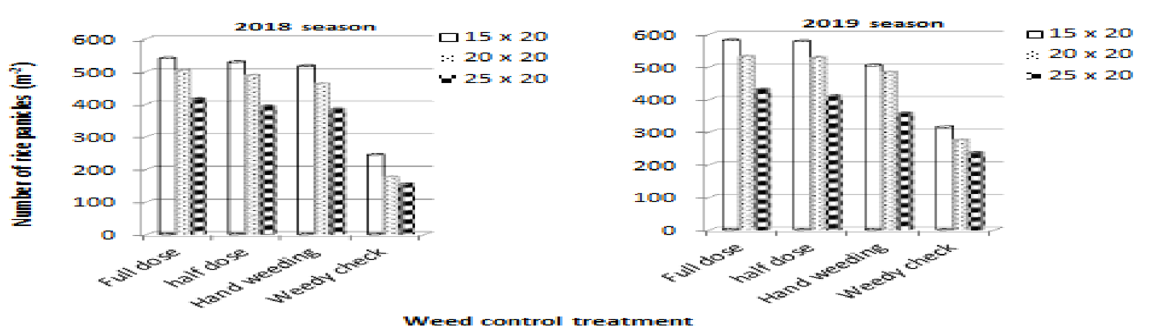

Fig. (2): Effect of interaction between transplanting space and weed control treatment on number of rice panicles $^{-2}$ in 2018 and 2019 seasons

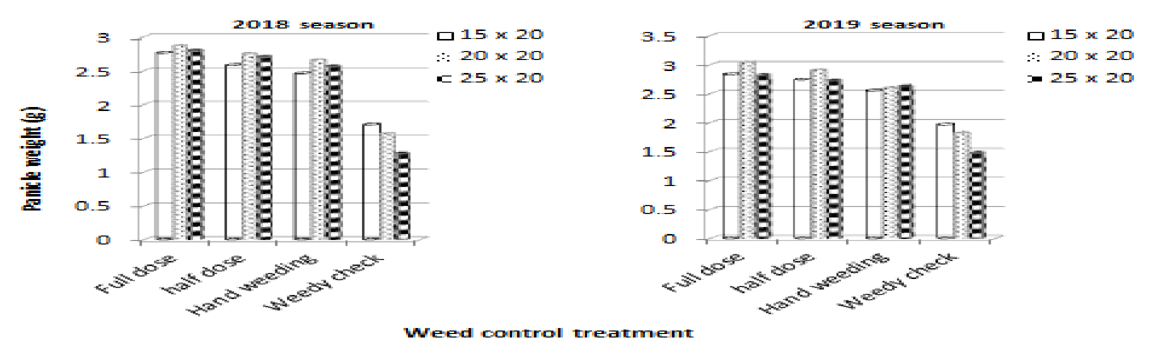

Fig. (3): Effect of interaction between transplanting space and weed control treatment on panicle weight of rice in 2018 and 2019 seasons

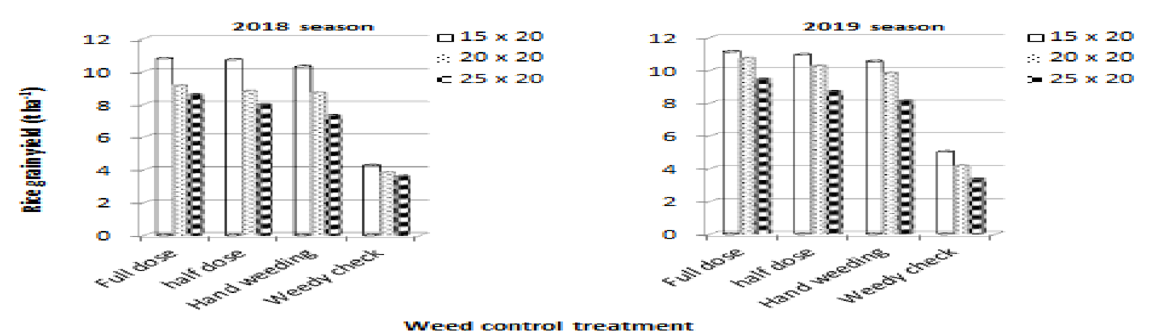

Fig. (4): Effect of interaction between transplanting space and weed control treatment on rice grain yield in 2018 and 2019 seasons

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دور الأليلوباثي ومسافات الشتل في خفض استخدام مبيدات الحشائش تحت ظروف الأرز الشتل

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تم إجراء دراسة حقلية في المزرعة البحثية بمحطة البحوث الزراعية بسخا، كفرالشيخ، مصر في عامي 2018 و 2019 لدراسة دور الأليلوباثي ومسافات الشتل في خفض استخدام مبيدات حشائش الأرز الشتل (الصنف سخا 106). تم شتل بادرات الصنف سخا 106 ذو القدرة الذاتية على مكافحة الحشائش تحت ثلاث مسافات شتل وهي 20x15 سم، 20x20 سم و 20x25 سم. أستخدمت أربع معاملات لمكافحة الحشائش وهي مبيد بندار 13,6% (ترايكلوبير 12% + بينوكسولام 1,6%) بالمعدل الموصى به ونصف الجرعة الموصى بها مقارنة بالنقاوة اليدوية والكنترول. حققت معاملة الشتل الضيقة أفضل مكافحة لحشيشة الدنيبة، العجيرة والسويدة كما سجلت أقل وزن جاف للحشائش الكلية بالاضافة لأعلى وزن للمادة الجافة للأرز ومحصول الحبوب ومكوناته للصنف سخا 106 في كلا الموسمين. بينما سجلت أعلى قيم للوزن الجاف للحشائش المختبرة وأقل قيم لصفات الأرز المدروسة تحت مسافة الشتل الواسعة في موسمي 2018 و 2019. تفوقت معاملة مبيد بندار 13,6% بالمعدل الموصى به على باقي معاملات مكافحة الحشائش المختبرة في مكافحة الحشائش وانتاج أعلى وزن جاف للأرز، عدد السنابل في المتر مربع، وزن السنبلة ومحصول الحبوب للصنف سخا 106 خلال موسمي الدراسة. سجلت معاملة مبيد بندار13,6% بالمعدل الموصى به أو بنصف الجرعة أفضل النتائج بدون فروق معنوية بينهما في مكافحة الحشائش وانتاج المادة الجافة للأرز، ومحصول الحبوب ومكوناته تحت مسافة الشتل الضيقة أثناء موسمي الدراسة. وفي النهاية يمكن استخلاص أن الصنف سخا 106 ذو القدرة الذاتية على مكافحة الحشائش يساعد في خفض استخدام مبيدات الحشائش إلى نصف المعدل الموصى به عند شتل بادرات الأرز يدوياً على مسافة 20x15 سم.