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Effect of Rice Cultivars and Herbicidal Combinations Integrations on Weeds and Yield of Broadcast-Seeded Rice Productivity and Economic Feasibility

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ABSTRACT

Nowadays there was an attitude from farmers to grow broadcasted seeded rice as an alternative to transplanted rice due to the scarce and costly labors in rice transplanting, but broadcasted seeded rice suffer severely from weed competition where sometimes the yield was sometimes completely lost. Finding good weed control package in rice fields which consist from. Main findings show that the use of old and newly herbicide molecules combination can succeed for sowing and rice broadcasted rice without problem. For these reasons two field experiments were conducted in split plot design were carried out at the Farm of Sakha Agricultural Research Station, Sakha, Kafrelshiekh , Governorate, Egypt during 2016 and 2017 summer seasons to evaluate the effect of two rice cultivars allocated as in the main plots two broadcasted seeded rice cultivars Sakha 106 and Sakha 104 were used in this study and thirteen weed control treatments which were the use of single herbicides or their combinations assigned in sub plots namely; Nominee at the rate of 800 cm/faddan, Saturn at the rate of 2 L faddan, Sirius at the rate of 80g/faddan, Basagran at the rate of 1.5 L/ faddan, Inpul at the rate of 20g/ faddan, Nominee at the rate of 800 cm L/faddan, followed by Basagran at the rate of 1.5 L/faddan, Nominee at the rate of 800cm /faddan followed by Sirius at the rate of 80g/faddan, Nominee at the rate of 800 cm/faddan followed by Inpul at the rate of 20g/ fed, Saturn at the rate of 2 L/faddan followed by Sirius at the rate of 80g\faddan, Saturn at the rate of 2 L/faddan followed by Basagran at the rate of 1.5 L/ faddan, Saturn at the rate of 2 L/faddan , followed by Inpul at the rate of 20g/faddan, hand weeding twice at 30 and 45 days and untreated check in each experiment on weeds, rice grain yield and its components as well as economic evaluation. Main finding results show that Sakha 106 cultivar had competiveness ability to weeds by good growth canopy and can participate by 24.9 & 25.0% weed suppression and increasing rice grain yield as tonnage per faddan by 10.55 & 15.09 % as compared with Sakha104 cultivar in both 2016 and 2017 seasons, respectively. This may be due that the vigorous growth of Sakha 106 cultivar which attributed to that cultivar more taller, more tillers and higher growth parameters to cover soil surface namely CGR,RGR and NAR which shed weeds and can combate with weeds than cultivar Sakha 104 conditions. On the other side the all used single herbicides or their combination succeeded to control weeds in rice yield by 37, 41 % and increasing grain yield as to tonnage per faddan by 1.398, 1.475 and exceeded hand weeding twice in two seasons, respectively. This may be due to the early elimination of weed competition and consequently improving rice all above rice growth parameters to utilize of natural resources of nutrients, light and space than untreated plots which heavily infested by weeds. The integration between both the role of rice cultivars and herbicides can maximize weed control and increase grain yield as tonnage per faddan than the use of single factor accompanied high incomes farmers. Application of inpul 20g /faddan+ Nominee 800 cm/faddan economical is considered as a good alternative to traditional weed control in broadcasted rice gave 82.9&84.% controlling of total weeds and increase in rice grain yield by 61.6 & 71.0% and exceeded hand weeding twice treatments as normal farmer practice for weed control in rice which gave 77.4 &77.7% weed control and increased grain yield 43.97 59.1 % in first and second seasons, respectively. Economic feasibility study of various studies weed management packages results referred clearly that under Kafrelshiekh condition by planting Sakha 106 cultivar with the use of any one of studied herbicides weed management is packages in broadcasted seeded rice and the best.

Keywords: *bispyribac sodium, thiobencarb, pyrazosulfuron- ethyl, bentazon, halosulfuron-methyl weeds, economic analysis, monocot, broadcasted seeded rice.*

INTRODUCTION

The long term sustainability systems requires weed management practices which promote resource conservation and environmental quality of broadcasted seeded rice because weeds are the biggest constraint; all types of weeds such as grasses, non-grasses, and sedges emerge simultaneously at high density with rice seedlings. Ultimately it reduces up to 40-100% yield rice. The weed presence is higher in wet direct-seeded than transplanted rice cultures which th transplanted rice can compete stringing weeds because rice is transplanted by rice transplanted growth precede weed germination during transplanting.

Manual weeding is an effective means of controlling weeds, but a declining labor force in the rural areas along with the rising cost of labor have encouraged the usage of herbicides. Reduction in seed germination %, growth parameters of the two tested rice weeds were recorded by methanol extract of allelopathic rice cultivar (Egyptian Jasmine). And as sown with rice cultivars application. Anatomical changes were obtained in the both rice weeds treated with methanol extract of rice cultivar (E. Jasmine) As previously shown Sakah 106 showed high effective in reducing and suppressing weed growth than those observed with Sakha 104 to allelophathy phenomena (Abdel-Razek *et al.* 2014). These results suggest that rice plant methanol extract may be a source of natural herbicide (bioherbicide) Ashry *et al.* (2012). Ferulic, p-hydroxybenzoic, vanillic, p-coumaric, and m-coumaric acids were the most active compounds and caused the greatest inhibitory effect on seed germination % of barnyardgrass (*Echinochloa crus-galli)*. Several researchers such as (Singh *et al*., 2008 and Mahajan *et al*., 2009) concluded that chemical weed control is feasible as it is quick easy and economical. Also, the critical period of weed competition expanded to almost rice cycle in directed seeded rice, which need herbicide combinations for widening weed control specters which cover weed expanded competition periods which can be in legates' with strong rice growth cultivars. Several workers reported about the possibility of weed control by using herbicide alone or in combination with other methods. Researchers reported that herbicides application attended to provide a great weed control and maximum yield of rice (Cavanna *et al.,* 2004).and Zhang *et al*. (2005) stated that the combination of fenoxaprop with bentazon controlled effectively both broad and narrow leaved weeds and increased rice grain yield.Talbert and Burgos (2007) found that penoxsulam did not injure rice but improved its yields comparing to standard

propanil-based programs. Penoxsulam(13.6%) decreased fresh weight of grassy weeds (monocot) and total weeds by, 39.2 and 35%,respectively, as compared with the untreated check,(Mousa and Noreldin, 2015). Yousefnia et *al*. (2012) indicated that herbicide application and hand weeding once gave the highest grain yield (4584 kg ha-1), as compared with, untreated check due to high unfilled grain/ panicle and less panicle number / square meter which had the lowest grain yield (2505 kg ha-1). Jamshid *et al*. (2012) indicated that thiobencarb with combination bentazon and propanil; oxadiargyl with mixed of bentazon and propanil; butachlor with mixed of bentazon and propanil gave 3454, 3390 and 3349 kg/ha yield, respectively, as compared with three time hand weeding treatment (3044 kg/ha). Grain yield was increased by using penoxsulam (13.6%) and hand-weeding twice by, 41, and 18%, respectively, in the first season, and 44 and 31%, respectively, in the second season as compared with the untreated check in the two seasons, (Mousa and Noreldin, 2015). The key for expanding cultivated area with broadcasted seeded rice in Egypt is to manage weeds by herbicides combinations to prevent long weed interference through the critical periods of weed competition in such rice plantations than manual weeding (Tagour *et al.*2016). Abou EL-Darag (2016) cited that the treatments the application of bispyribac + thiobencarb at 0.03 + 1.8 kg ai / ha and thiobencarb + pyrzosulfuron at 3.6 + 0.025 kg ai / ha recorded the highest efficiency against weeds followed by bispyribac + pyrzosulfuron at 0.02 +0.025 kg ai/ ha.

Accordingly, The use of only one method of weed control in a broadcasted seeded rice crop may not be successful for raising a good crop. Various methods such as cultural practices and manual, cultivars, mechanical, and chemical methods should be carried out together that was the main aim of the current study. Thus, the present work aimed to evaluate the effect of some rice cultivars on weed suppression by strong weed computation of rice cultivars on post emergence herbicide combinations on broadcasted seeded rice productivity with growth analysis of rice cultivars plants under different studied weed control treatments.

MATERIALS AND METHODS

Two- field experiments were undertaken in clayey soil at the Farm of Sakha Research Station. Kafrelshiekh, Egypt during 2016 and 2017seasons. The study aimed to evaluate the effect of some rice cultivars under the use of some post emergence herbicide combinations on weeds and broadcasted rice productivity in the experimental a split-plot design which included twenty six treatments four replicates. Two rice cultivars namely Sakha 106 and Sakha 104 were allocated in the main-plots, while thirteen weed control treatments were assigned in the sub-plots plot size 3*3.5=10.5 m^2 as follows:

1-Nominee 2% SL (bispyribac sodium) sodium 2,6,-bis(4,6-dimethoxypyrimidim-2-yloxy) benzoate at the rate of 800 cm/faddan was applied at 14 days after sowing.

2-Saturn 50% EC (thiobencarb) [S-4-chlorobenzyl diethyl (thiocarbamate)] at the rate of 2.0 L/ faddan was applied at 7 days after sowing.

3-Sirius 10% WP (pyrazosulfuron- ethyl) ethyp5-[[[[(4,6-dimethoxy-2-pyrimidimyl) amino] carbony] amino] sulfmyl]- 1- methyl-zh-pyrazole-4-curboxylate at the rate of 80g\faddan was applied at 5 days after sowing.

4- Basagran 48% AS (bentazon)[3-isopropyl-1 H-2, 1, 3-benzothiadiazin-4(3H)-one 2, 2-dioxide] at the rate of 1.5 L/ faddan was applied at 12 days after sowing.

5- Inpul 75%WG (halosulfuron-methyl)[methyl 3-chloro-5-(4,6-dimet hoxypyrimidin-2-ylcarbamoylsulfamoyl)-1-et hylpyrazole-4-carboxylate] at the rate of 20g/ faddan was applied at 12 days after sowing.

6- Basagran 48% AS at the rate of 1.5 L/ fed was applied at 12 days after sowing followed by Nominee 2% SL at the rate of 800 cm/fed was applied at 14 days after sowing.

7- Sirius 10% WP at the rate of 80g\fed was applied at 5 days after sowing followed by Nominee 2% SL at the rate of 800 cm L/faddan was applied at 14 days after sowing.

8- Inpul 75%WG application at the rate of 20g/ faddan was applied at 12 days after sowing followed by Nominee 2% SL at the rate of 800 cm/faddan was applied at 14 days after sowing.

9- Sirius 10% WP at the rate of 80g\faddan was applied at 5 days after sowing followed by Saturn 50% EC at the rate of 2 L/faddan was applied at 7 days after sowing.

10 – Saturn 50% EC at the rate of 2 L/faddan was applied at 7 days after sowing followed by Basagran 48% AS at the rate of 1.5 L/ faddan was applied at 12 days after sowing.

11- Saturn 50% EC at the rate of 2 L/faddan was applied at 7 days after sowing followed by Inpul 75%WG at the rate of 20g/ faddan was applied at 12 days after sowing.

12- Hand weeding twice at 30 and 45 days after sowing. .

13- Unweeded check.

The previous winter crop was wheat in both seasons. Land preparation was done as two plowings, harrowing, and dry leveling. The rest of agronomic practices, water management and fertilization were applied as recommended for broadcasted seeded rice. Calcium super phosphate (15.5% P2O5) at the rate of 100 kg/ fad was basal added and incorporated into the soil. Seeded rice was broadcasted in 15 and 12 May in the first and the second seasons, respectively at seed rate of 60 kg/ fed which were soaked in water for about 36 hour and incubated for 24 hour. All agronomic practices in broadcast-seeded rice such as, land preparation, fertilization and irrigation were done as recommended (nitrogen fertilizer at 69 kg N/ fed and was applied at the form of urea 46.5% N) in three equal rate after sowing. seeded rice. Herbicides treatments were sprayed by knapsack sprayer CP3 with water volume of 200 L/fad on drained plots. The water was flooded the day after herbicide application and kept for 5 days.

Table a. Mechanical and chemical analysis of experimental soil during the 2016 and 2017 seasons.

Seasons	Soil	Particle size distribution				Texture	O.M.	Caco3	PH (1:2.5)
	Depth (cm)	Coarse sand%	Fine Sand%	Silt %	Clayey %	Class	%	%	Suspe
2016	0-30	1.74	13.34	21.71	63.19	Clayey	1.21	2.35	7.9
2017	0-30	1.71	13.33	21.79	63.21	Clayey	1.22	2.31	7.3

Data recorded:

1- On Weeds:-

Weeds were hand pulled randomly from one square meter from each plot after 60 and 75 days from sowing and classified into two as weeds categories dicotyledons and monocotyledons. Weeds were air-dried, and then oven dried to constant weight for 48 hours at 70˚C. and weight was recorded as (g/m^2).

The percent of weed reduction (R) was calculated using the following equation:

$$R = (A - B/ A) \times 100$$

Where: **A and B refer to dry weight of weeds in the untreated check and treated plots, respectively.**

On rice growth analysis:-

Plants were taken from 50x50 cm quadrate from each sub-plot at 60 and 75 days after sowing and transferred to the laboratory, dry matter g/m2 and leaf area cm2/ plant were measured by leaf area meter. The crop's growth rate (CGR) by estimating the increase of plant material per unit of ground area per unit of time at the 60&75days from planting intervals was estimated using the following formula;

$$CGR= (W_2-W_1)/(T_2-T_1)\ g/m^2/week,$$ (Hunt ,1978).

The relative growth rate (RGR): The increase of plant material per unit of present per unit of at the two intervals was measured as follows:-

$$RGR = (\log_e w_2-\log_e w_1)/(t_1-t_2)$$ g/g/week, (Hunt ,1978).

Net assimilation rate (NAR) The increase of plant material per unit of time

$$NAR= (W_2-W_1)\ (\log_e A_2-\log_e A_1)/(A_2-A_1)\ (T_2-T_1)$$

g/m^2/week. According to Hunt (1978).

Where: **W_1, A_1 and W_2, A_2 respectively refer to dry weight and leaf area at time (T_1 and T_2) in weeks.**

2-- Rice yield and yield components:

At harvest, plant height was estimated as well as total number of tillers and panicles of ten plants for each plot was counted to determine the numbers /m^{-2}. Ten main panicles from each plot were packed to determine panicle length (cm), panicle weight and 1000-grain weight. The plants of the six inner rows of each plots were harvested, dried, threshed and then grain and straw yields were determined and adjusted to 14 % moisture content as well as converted into t/ faddan.

3--Economic feasability:

According to Heady and Dillon (1961), the economic evaluation for grain yield of rice (ton/fed), variable costs, gross income (GI), profitability and benefit/cost ratio (B/C) were calculated According to Dunan *et al*. (1995), as follows:

1- Total costs (costs, fertilization, irrigation, insect control, harvesting and rental value per fed. of land preparation, planting, post sowing activities
2- Gross income (GI) = (price x LE Egyptian pound) x (grain yield (ton / faddan).
3- Net income (NI) = gross income – total costs.
4- Profitability (P) = (net income/total costs) x 100.
5- Benefit/Costs Ratio (B/C) = gross income/total costs.

*Egyptian Ministry of Supply and Internal Trading 2017season

4-- Statistical analysis:

All obtained data were statistically analyzed according to the technique of analysis of variance (ANOVA) for the design as published Gomez and Gomez (1984). Least significant difference (LSD) at 5% level was used to test the difference between treatment means at 5 % of probability as described by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

1- Effect of the cultivars and weed control treatments: On weeds:

Rice cultivar

The recorded weed species in untreated plots during the two seasons were *Echinochloa colonum* L., *Echinochloa crus-galli* L., *Scirpus maritimus,* L. and *Cyperus rotundus* L. as monocotyledons weeds, and *Portulaca oleracae* L., *Ammannia auriculata Willd*, and *Eclipta alba* L. as dicotyledons weeds. Data presented in Table1&2 show the effect of rice cultivars and weed control treatments and their interaction on weed growth during 2016and 2017.

Results indicated clearly that Sakha 106 rice cultivar significantly depressed the dry weight of both dicot and monocot weeds and their total in two weed assessments in both studied seasons. In first season, sowing rice Sakha 106 rice cultivar reduced the dry weight of monocot and dicot weeds by 22.14 and 21.4% at 60 DAS and 24.9 and 25.0%, respectively, at 75 DAS and by 24.1 and 24.0% at 60 DAS, and 24.9% and 24.9%, respectively at 75 DAS in the second season as compared with rice Sakha 104 rice cultivar. These results were true in seasons indicating that Sakha 106 rice cultivar had some role in weed management in broadcasted rice.

Weed control treatments

Data in Table 1 show that total dry weight of the two weed categories were significantly affected by all weed control treatments in the two assessments in both seasons. In the first season, at 60 DAS weed control treatments could be arranged in a descending order with regard to their controlling effects on dry weight of total weeds as starting from: Nominee 800 cm/faddan + Sirius 80 g/ faddan 85,7, Basagran 1.5 L/faddan +Nominee 800 cm/faddan, 83.4%, Saturn 2L/faddan + Inpul 20 g/faddan 82.7, Sirius 80 g/faddan +Saturn 2L 82.7 and hand weeding twice 80.3% as compared to the untreated check, respectively. The previous respective treatments reduced the total dry weight of weeds by 82.7, 81.4, 81.2%, 78.6%, 77.4% at 75 DAS as compared to untreated check The same treatments arrangement and results approximately were observed at the two assessments in the second season: Nominee 800 cm /faddan Inpul 20g/faddan 84.8, Basagran 1.5 L/ faddan +Nominee 800 cm /faddan 83.0, Sirius 80 g/faddan+Saturn 2 L 82.2,Saturn 2 L+ Inpul 20g/faddan 82.3 and hand weeding twice 77.7 as compared with the untreated check, at 60 DAS and by 84.3, 82.9,80.6,79.5 and 77.7 from those treatments at 75 DAS.

Rice cultivars x weed control treatments:

The effect of interactions between cultivars and weed control treatments had significant effect on dry weight of total weeds through two seasons.

The high efficiency of those herbicide combinations against weeds in broadcasted seeded rice is attributed to widening weeds control spectrum by Saturn & Nominee against Echinochloa colonum L., Echinocloa crus-gallia and Cyperus difformis plus Inpul or Bazagran and Sirius against dicot weeds. Similar results were obtained by Mousa and Noreldin, (2015).William, (1994) reported that Ronstar PRE (as pre emergence) herbicide was effective on controlling

active annual grasses and broadleaf weeds and noticed that, halosufuron-methyl (as a pre-emergence and early post-emergence) had a broad spectrum on controlling broadleaf weeds with some activity on grass weeds.

Data in Table 2 show that the effect of interaction between rice cultivars and weed control treatments was significant on dry weight of weed. The combination of Sakha 106 and weed control treatments Inpul 20g/faddan +Nominee 800 cm / faddan produced the highest percentage of controlling total weeds by 88.2 % as compared with Sakha 104 under untreated check.

Table 1. Dry weight g/m^2 of annual weeds at 60 and 75 D A S as affected by cultivars and weed control treatments in broadcasted seeded rice during 2016 and 2017 seasons.

Treatments	Rate/ faddan	60 D A S			75 D A S		
		Dicot (g/m^2)	Monocot (g/m^2)	Total weeds (g/m^2)	Dicot (g/m^2)	Monocot (g/m^2)	Total weeds (g/m^2)
2016 season							
Rice cultivars(A)							
Sakha 106		77.6	89.8	167.4	80.8	102.9	183.7
Sakha 104		98.8	115.3	214.1	107.7	137.1	244.8
F. test		**	**	**	**	**	**
Weed control treatments(B)							
1-Nominee	800 cm	96.1	111.3	207.4	96.7	123.1	219.8
2- Saturn	2 L	96.2	111.5	207.7	96.1	122.3	218.3
3- Sirius	80 g	90.1	105.4	196.5	115.3	146.7	261.1
4- Basagran	1.5 L	108.5	125.7	234.2	112.1	142.6	254.7
5- Inpul	20 g	96.9	112.2	209.1	100.1	127.4	227.4
6- Sirius +Nominee	80g+800cm	59.4	69.1	128.8	60.0	67.4	136.4
7- Basagran +Nominee	1.5L+800cm	48.6	56.8	105.4	52.8	67.1	119.9
8- Inpul +Nominee	20g+800 cm	41.8	48.8	90.7	50.6	64.4	114.1
9- Sirius +Saturn	80gL+2 L	50.8	59.3	110.2	55.1	70.1	125.3
10- Saturn+Basagran	2 L+1.5 L	55.1	64.3	119.4	62.9	80.1	142.1
11- Saturn+Inpul	2 L+20 g	50.7	59.2	109.1	63.9	81.3	145.2
12- Hand weeding	-	57.7	76.3	124.9	66.5	84.6	151.1
13- Weedy check	-	293.1	342.4	635.5	293.6	373.7	667.3
L S D at 0.05	-	28.8	34.9	63.6	28.7	36.5	65.1
Interaction (A X B)	-	**	**	**	**	**	**
2017 season							
Rice cultivars(A)							
Sakha 106		77.6	91.1	168.7	79.2	100.8	180.0
Sakha 104		102.1	119.9	222.0	105.5	134.3	240.0
F. test		*	**	**	**	**	**
Weed control treatments(B)							
1-Nominee		91.0	106.8	197.8	99.8	127.0	226.8
2- Saturn	800 cm	91.25	107.1	198.4	102.0	129.8	231.8
3- Sirius	2 L	94.0	110.4	204.4	97.5	1241	221.5
4- Basagran	80 g	111.7	131.1	242.8	114.5	145.7	260.1
5- Inpul	1.5 L	96.2	112.9	209.1	100.8	128.3	229.2
6- Sirius +Nominee	20 g	62.6	73.5	136.1	63.1	80.3	143.5
7- Basagran +Nominee	80g+800cm	51.2	60.1	111.3	49.1	62.5	111.7
8- Inpul +Nominee	1.5L+800cm	45.9	53.9	99.8	45.2	57.4	102.6
9- Sirius +Saturn	20g+800 cm	53.7	63.0	116.7	55.9	71.2	127.1
10- Saturn+Basagran	80gL+2 L	56.5	66.3	122.8	60.6	77.2	137.8
11- Saturn+Inpul	2 L+1.5 L	53.4	62.7	116.1	59.3	75.5	134.8
12- Hand weeding	2 L+20 g	59.3	69.6	128.9	64.3	81.8	146.1
13- Weedy check	-	301.5	353.9	655.5	288.4	367.0	655.4
L S D at 0.05	-	30.0	35.2	56.1	28.3	36.0	64.3
Interaction (A X B)		**	**	**	**	**	**

DAS= days after sowing

On rice growth analysis:

Rice cultivars

Data in Table 3 show the rice growth performance namely: dry weight g/m^2, leaf area cm^2/plant, CGR, RGR and NAR on broadcasted seeded rice at 60 and 75 DAS as affected by rice cultivars during 2016 and 2017 seasons. The results indicated that dry weight g/m^2, leaf area cm^2/plant, CGR, RGR and NAR was significantly influenced by different cultivars during the two seasons. The Sakha 106 rice cultivar gave highest dry weight of, CGR, RGR and NAR. The positive effect of Sakha 106 in reducing dry weight of weeds compared to Sakha 104 cultivar this may be attributed to the high competitiveness ability of Sakha 106 cultivar against such weeds because of the similarity of their growth and using the same zone to obtain nutrients and light as mentioned by weed control.

Weed control treatments

In the present study, photosynthetic characteristics of cultivated rice were affected by weedy rice density. However, the final rice yield was more highly correlated with the net photosynthetic rate during the growth process during tillering stages. These findings demonstrated that the

reduced photosynthetic rate under high densities of weedy rice was associated with a serious decline in rice production. One reason for decreased photosynthetic performance could be fact that weedy rice became a more aggressive competitor at the 60 and 75 days from sowing, causing shading and nutrient stress to cultivated rice. The canopy of cultivated rice and weedy rice already started overlapping; weedy rice exerted severe competition for light. Moreover, there is strong evidence from previous research that weedy rice is a much stronger competitor for nitrogen than cultivated rice (Estorninos *et al*. 2002, Chauhan 2011); weedy rice acquires more N, and has higher N-use efficiency for biomass production than that of rice. These factors resulted in reduced assimilative capacity of cultivated rice were significantly influenced by the tested weed control treatments. The effect of different growth factors under these treatments since they recorded .All growth parameters at studied growth stages, *viz* total dry weight, CGR, RGR and NAR were significantly influenced by the tested weed control treatments. The effect of different weed management practices on total dry weight, CGR, RGR and NAR was highly significant at studied growth stages. It was found that the two hand weeding at 30 DAS and 45 DAS, followed by Saturn followed by Inpul and Saturn followed by Basagran were the most effective treatments to enhance the total dry weight, CGR, RGR and NAR.

Table 2. Total dry weight of weed at 60 and 75 D A S affected by the interaction between rice cultivars and weed control treatments during 2016 and 2017 seasons.

Cultivars	Treatments	Rate/ faddan	Dry weight of total weeds(g/m^2)					
			Weed seasons					
			2016season			2017season		
			60 days	75 days	Control %	60 days	75 days	Control %
Sakha106	Nominee	800 cm	153.9	168.3	79.5	144.2	155.1	82.1
	Saturn	2 L	161.3	165.5	79.8	152.3	167.3	80.6
	Sirius	80 g	224.8	242.4	70.4	221.3	234.4	72.9
	Basagran	1.5 L	254.8	273.7	66.6	244.1	264.2	69.5
	Inpul	20 g	254.0	262.2	68.0	231.4	247.6	71.4
	Sirius +Nominee	80g+800cm	101.8	109.3	86.7	112.4	111.5	87.1
	Basagran+Nominee	1.5L+800cm	93.9	97.3	88.8	101.2	106.4	87.7
	Inpul+ Nomini	20g+800 cm	82.7	91.1	86.4	96.7	102.4	88.2
	Sirius+Saturn	80gL+2 L	97.3	108.3	88.9	98.7	112.1	87.1
	Saturn+Basagran	2 L+1.5 L	103.8	110.0	86.5	107.8	121.1	86.1
	Saturn+Inpul	2 L+20 g	90.5	118.7	85.5	100.0	110.2	87.2
	Hand weeding	-	110.2	126.9	75.3	116.0	122.4	85.9
	Weedy check	-	464.4	514.5	37.5	466.7	484.7	44.0
Sakha 104	Nominee		260.9	271.3	66.9	251.4	298.4	65.5
	Saturn	800 cm	254.0	271.1	66.9	244.4	296.3	65.8
	Sirius	2 L	167.9	281.5	65.7	187.4	208.6	75.9
	Basagran	80 g	214.3	235.6	71.3	241.4	256.1	70.4
	Inpul	1.5 L	180.4	192.6	76.5	186.7	210.7	75.7
	Sirius +Nominee	20 g	155.7	163.5	80.1	159.7	175.4	79.7
	Basagran+Nominee	80g+800cm	116.9	142.4	82.6	121.4	116.9	86.5
	Inpul+ Nomini	1.5L+800cm	98.6	138.8	83.1	102.8	102.8	88.1
	Sirius+Saturn	20g+800 cm	123.0	142.2	82.7	134.7	142.0	83.6
	Saturn+Basagran	80gL+2 L	134.9	175.9	78.6	137.7	154.4	82.1
	Saturn+Inpul	2 L+1.5 L	129.4	171.6	79.1	132.1	159.3	81.6
	Hand weeding	2 L+20 g	139.6	175.3	78.7	141.9	169.7	80.4
	Weedy check	-	806.5	820.1	0.0	844.3	866.1	0.0
LSD at 0.05			9.47	9.28		9.76	9.67	

DAS= days after sowing

This is mainly attributed to very little crop-weed competition for different growth factors under these treatments since they recorded lowest population of narrow, broad leave weeds and sedges weeds species as well as lowest weed dry weight, which provided better opportunity to the crop to utilize nutrients, moisture, light and space in better way for its proper growth and development. Furthermore, under such treatments plants under less crop-weed competition possessed more vertical and horizontal growth resulted in more plant height and numbers of tillers per plant as compared to other treatments.The current finding are in line with Bheu *et al.* (2016) they reported that application of herbicide significantly increased plant height and numbers of tillers per plant over weedy check. Weeds reduce crop growth and ultimately the yield through competition for nutrients, space, moisture and light as a result of their better adaptation to adverse environmental conditions as compared to crop plants. The control of weeds at critical stages of crop-weed competition turn the growth factor in favor of crop plants. Better use of growth factors by rice plant in the plots receiving weed control treatments due to less crop-weed competition reflected on plant growth characters viz., plant height, number of tillers and crop dry matter accumulation attributed to low dry weight of weed as a result of less competition.

Interaction between rice cultivars x weed control

Table (3) show the effect of rice cultivar x weed control treatments on various growth parameters CGR, RGR and NAR were not statistically significant in both seasons meaning that both rice cultivars and weed control treatments act independent.

Table 3. Some growth characteristics of rice at 60 and 75 D A S as affected by cultivars and weed control treatments in broadcasted seeded rice in during 2016 and 2017 seasons

Treatments	Dry matter (g/m^2)		Leaf area (cm^2/plant)		CGR	RGR	NAR
	at 60 DAS	at 75 DAS	at 60 DAS	at 75 DAS	Period 60-75 DAS		
2016 Season							
Main plots (Cultivars) (A)							
Sakha 106	488.0	572.9	133.9	177.8	58.3	0.114	0.160
Sakha 104	354.2	499.9	120.1	167.4	49.4	0.110	0.154
F. test	**	**	**	**	**	*	**
Sub-plots (Weed control)(B)							
1-Nominee	406.0	511.6	123.5	170.7	49.3	0.108	0.147
2- Saturn	399.3	503.1	121.2	165.5	49.4	0.110	0.151
3- Sirius	386.9	489.5	117.6	160.4	47.9	0.109	0.151
4- Basagran	379.0	482.6	115.0	157.1	48.3	0.113	0.155
5- Inpul	414.1	530.7	126.1	171.3	54.4	0.115	0.160
6- Sirius +Nominee	442.6	561.6	134.3	183.5	55.6	0.116	0.153
7- Basagran +Nominee	451.9	569.4	137.1	187.3	54.8	0.111	0.148
8- Inpul +Nominee	453.4	583.2	137.6	187.9	60.6	0.108	0.163
9- Sirius +Saturn	425.0	544.0	128.6	175.7	55.5	0.115	0.160
10- Saturn+Basagran	442.5	571.5	134.3	183.4	60.2	0.119	0.166
11- Saturn+Inpul	463.0	599.9	140.9	191.9	63.9	0.121	0.168
12- Hand weeding	472.6	617.2	143.4	196.0	67.5	0.125	0.174
13- Weedy check	338.4	409.0	84.3	112.6	33.0	0.088	0.146
L S D at 0.05	17.18	25.38	6.89	9.67	3.92	0.004	0.004
Interaction (A X B)	N S	N S	N S	N S	N S	N S	N S
2017 season							
Main plots (Cultivars) (A)							
Sakha 106	484.3	619.7	139.7	148.4	62.4	0.114	0.191
Sakha 104	395.6	495.1	123..9	132.8	46.4	0.105	0.153
F. test	**	**	**	**	**	**	**
Sub-plots (Weed control)(B)							
1-Nominee	394.4	484.0	128.2	136.0	41.8	0.096	0.138
2- Saturn	385.8	500.0	125.7	133.5	53.3	0.121	0.179
3- Sirius	381.5	506.9	122.1	129.6	58.6	0.133	0.202
4- Basagran	402.4	502.8	119.3	126.7	46.9	0.104	0.165
5- Inpul	417.6	532.9	130.9	139.0	53.8	0.114	0.173
6- Sirius +Nominee	428.0	549.9	139.4	147.9	56.9	0.117	0.172
7- Basagran +Nominee	457.8	573.2	142.3	151.1	53.9	0.105	0.160
8- Inpul +Nominee	477.3	594.4	147.8	151.6	54.7	0.103	0.159
9- Sirius +Saturn	483.1	603.7	133.4	141.9	56.3	0.104	0.178
10- Saturn+Basagran	497.9	629.8	139.4	147.9	61.5	0.110	0.186
11- Saturn+Inpul	517.9	656.2	146.3	155.3	64.5	0.111	0.186
12- Hand weeding	528.4	686.9	148.8	158.0	74.0	0.123	0.205
13- Weedy check	346.9	412.0	89.3	109.1	30.4	0.080	0.134
L S D at 0.05	25.73	26.49	7.16	6.08	4.70	0.006	0.009
Interaction (A X B)	N S	N S	N S	N S	N S	N S	N S

3- Rice cultivars

Rice yield and attributes:

Results in Table 4 show that both of rice cultivars had significant effect on grain yield and yield attributes of rice in 2016 and 2017 seasons. Whereas Sakha 106 cultivar had higher yield components i.e., plant height, number of tillers/m^2, number of panicles/m^2, panicle length, grains weight /panicle, 1000- grain weight, and grain yield during 2016 and 2017, respectively than of Sakha104 rice cultivar. Furthermore, panicle weight, 1000-grain weight, grain yield ton fad^{-1} were influenced by different rice cultivars during the two seasons. Sakha 106 rice cultivar exceeded Sakha 104 ♀and recorded the highest values of panicle weight, filled grain panicle and grain yield t/fad. followed by Sakha 104 rice cultivar. As previously shown Sakha 106 showed high effective in reducing and suppressing weed growth than those observed with Sakha 104 to allelophathy phenomena abdel-Razek *et al.*,2014). Similar results were obtained by El-Nameky (2007) and Shebl *et al.* (2009) and Ampong- Nyarko and De Data (1991) and Smith (1988). Furthermore, panicle weight, filled grain panicle, 1000-grain weight, grain yield ton/fed were influenced by different rice cultivars during the two seasons.

Sakha 106 rice cultivar exceeded Sakah 104 ♀and recorded the highest values of panicle weight, filled grain panicle and grain yield t/fed. As previously shown Sakah 106 showed high effective in reducing and suppressing weed growth than those observed with Sakha 104 that might attributed to allelophathy phenomena Abdel-Razek *et al.*,2014).

Effect of weed control treatments

Weed control treatments had a substantial increasing effect on rice grain yield and its components i.e., plant height cm, number of tillers number of panicles/m^2, panicle length cm, grain weight /panicle, number of grains / panicle, 1000-grain weight(g) and grain yield ton/ fed as comparing to untreated check in both seasons.

Table 4. Rice yield and yield as attributes affected by rice varieties and weed control treatments during 2016 and 2017 seasons.

Treatments	Rate/ faddan	Plant height (cm)	No. of tillers/ m^2	No. of panicles / m^2	Panicle length (cm	Grain weight/ panicle (g)	No. of grains / panicle	1000-grain weight (g)	Grain yield t/ faddan	Increase yield(t/ faddan)
2016 season										
Sakha 106	-	89.8	344.8	303.4	25.1	3.56	76.3	25.8	3.436	0.328
Sakha 104	-	79.3	305.4	277.6	22.3	3.1	73.2	24.5	3.108	0.0
F. test 5%	-	**	**	**	**	**	**	**	**	
1-Nominee	800cm	82.7	317.0	280.7	23.2	3.28	64.7	25.6	3.161	0.789
2-Saturn	2 L	81.0	311.8	276.1	22.8	3.22	66.0	25.2	3.296	0.924
3-Sirius	80 g	78.5	302.2	269.3	22.1	3.12	68.2	25.8	3.202	0.830
4-Basagran	1.5 L	76.9	297.0	264.7	21.6	3.06	76.5	25.8	3.368	0.996
5-Inpul	20 g	83.8	322.7	285.7	23.6	3.33	80.0	28.4	3.359	0987
6- Sirius +Nominee	80g +800cm	89.8	348.0	309.6	25.2	3.57	82.1	26.5	3.367	0.995
7-Basagran+Nominee	1.5 L+800cm	91.7	352.9	313.9	25.8	3.64	83.0	24.5	3.248	0.876
8-Inpul+Nominee	20g+800cm	92.0	354.0	314.9	25.8	3.66	78.9	26.1	3.770	1.398
9-Sirius +Saturn	20 g+2l	86.0	330.9	296.3	24.2	3.42	79.7	24.9	3.295	0.983
10-Saturn+Basagran	1.5 L+ 2L	89.8	345.7.	307.5	25.2	3.57	79.4	25.2	3.461	1.089
11-Saturn +Inpul	2 L+20 g	93.9	361.6	329.2	26.4	3.74	85.0	25.8	3.220	0.848
12-Hand weeding	-	95.9	369.3	336.8	26.9	3.82	67.3	24.7	3.414	1.042
13-Weedy check	-	56.8	212.4	190.9	15.5	2.19	58.8	18.1	2.372	0.0
L.S.D at 0.05	-	4.57	18.3	16.9	1.3	0.19	N.S	1.03	0.14	**
Interaction (A X B)	-	**	**	**	**	**	N.S	**	**	
2017 season										
Sakha 106	-	102.0	337.6	331.0	23.9	3.42	80.66	25.03	3.469	
Sakha 104	-	90.3	296.7	293.2	21.3	3.04	77.82	23.92	3.014	0.455
F. test 5%	-	**	**	**	**	**	**	**	**	0.0
1-Nominee	800cm	93.8	310.5	304.4	22.0	3.14	68.6	24.8	3.192	1.094
2-Saturn	2 L	92.3	305.4	299.4	21.6	3.14	72.1	24.5	3.268	1.170
3-Sirius	80 g	89.4	295.9	290.1	21.0	3.00	72.3	25.0	3.355	1.260
4-Basagran	1.5 L	87.9	290.9	285.2	20.5	2.93	81.2	25.1	3.482	1.384
5-Inpul	20 g	95.5	313.9	309.8	22.4	3.20	84.8	27.7	3.535	1.437
6- Sirius +Nominee	80g +800cm	103.0	340.8	334.1	24.0	3.43	87.0	25.8	3.337	1.239
7-Basagran+Nominee	1.5 L+800cm	104.4	344.6	338.8	24.6	3.50	88.0	23.7	3.123	1.025
8-Inpul+Nominee	20g+800cm	104.7	344.8	339.9	24.6	3.51	83.6	25.4	3.573	1.475
9-Sirius +Saturn	20 g+2l	97.9	324.1	317.7	23.0	3.30	84.5	24.6	3.080	0.982
10-Saturn+Basagran	1.5 L+ 2L	102.3	333.5	331.9	24.0	3.43	84.5	24.2	3.582	1.484
11-Saturn +Inpul	2 L+20 g	107.0	350.1	347.2	25.1	3.59	90.3	25.0	3.183	1.085
12-Hand weeding	-	109.2	361.6	354.5	25.6	3.67	65.5	23.9	3.337	1.239
13-Weedy check	-	62.8	207.9	203.9	15.4	2.14	67.2	17.9	2.098	
L.S.D at 0.05	-	2.7	23.4	23.2	1.6	0.23	NS	1.29	0.226	0.0
Interaction (A X B)	-	*	**	**	*	*	*	**	**	

DAS= days after sowing

Data showed that weed control treatment of Nominee 0.8 L + Inpul 20g / faddan, Saturn 2 L faddan +Basagran 1.5 L/ faddan, hand weeding twice, Basagran 1.5 L/ faddan + Nominee 0.8 L and Inpul 20g / faddan 41.7%, respectively in the first season and 70.3, 70.7, 59.1, 51.7 and 39.9%, respectively in the second season, significant effect on number of filled grain/panicle and grain yield in the first season and on number of tillers/m^2, grain weight /panicle (g), 1000- grain weight(g) and grain yield(ton/faddan), respectively in the second season.

The use of herbicidal combinations in this study led to decrease monocot and dicot weeds and was effective more than hand weeding twice as well as to reduce the critical period of competition between weeds and rice plant resulted in apparent increase in vegetative characterise and rice grain yield Similar results were revealed by Shebl *et al.* (2009) and Abou EL-Darag (2012) Sakha 106 rice recorded the heaviest panicles when weeds were controlled by Bispyribac + pyrzosulfuron + cultivars Sakha 106 rice with bispyribac + thiobencarb but, weed control treatment by Bispyribac + pyrzosulfuron with all cultivars, gave the highest panicle weight +cultivars Sakha 106 rice with Bispyribac + thiobencarb compared to the other weed control treatments and cultivars.

Interaction effect:

On rice:

Results in Table 5 show that the effect of interactions between rice cultivars and weed control treatments on plant height cm, number of tillers /m2, number of panicles m2, panicle length cm, grain weight panicle (g), 1000-grain weight (g) and grain yield ton/ fed were statistically significant in both seasons. The combination of Sakha 106 and hand weeding twice gave the tallest plants followed by treatments nominee + Inpul with same cultivar without significant differences under broadcasted seeded rice.

All yield attributing characters were significantly increased over weed check by all weed control treatments (Table 5). The highest number of grains panicle which was at par with T8, T11, T8 and T12 significantly superior over the rest of the treatments. The weedy check (T13) recorded the lowest number of grains panicle^{-1}. The positive effect of weed control treatments in reducing competition of weeds increased the efficiency of plant utilizing for growth factors

which ultimately reflected on increasing number of grains panicle^{-1}. Bheru *et al.* (2016) reported that post emergence application of Nominee800 cm/faddan + Inpul 20g/faddan at 14+12 DAS (T8) and recorded that stale seedbed followed by bispyribac. Weed free (W1) recorded the maximum test weight and it was at par with those of T8, T10, T4, T6, T12, T5, T7 and T9. Weed check (T2) recorded the lowest test weight and was statistically inferior to all the other weed management treatments. This might be due to elimination of weed competition to a great extent application of Nominee 800 cm /faddan + Inpul 20g / faddan at 14+12 DAS (T8). Bheru *et al.* (2016) reported that the highest test weight was recorded in weed free by repeated hand weeding and lowest in weed check. The lowest grain yield (2.112 t./fed) was found to be associated with weed check (T13). Weed free treatment T12, yield was increased by 62.46 %, due to the regular weeding and the reason decrease in weedy check (166.39 %) was that no cultural practiced was done. Also, reported that number of panicles m^{-2} was highly correlated with grain yield. The highest grain yield was recorded with application of Nominee +Inpul 800 cm /fed +20g / faddan at 14+12 DAS (T8). This results are in agreement with those reported by of Bheu *et al.* (2016) they reported that application of Nominee +Inpul 800 cm +20g / faddan at 14+12 DAS gave higher grain yield. Weed check (T13) recorded the lowest grain yield. This may be due to severe crop weed competition. The highest mean of rice grain yield (3.96 and 3.82 ton/ faddan was obtained from, the effect of Sakha 106 rice cultivars with Nominee 800 cm + Inpul 20 g/faddan, but, Nominee 800 cm+Sirius 80 g/faddan gave grain yield (3.54 and 3.57 ton/ faddan, Saturn 2 L /faddan +Inpul 20g / faddan (3.36 and 3.41 ton/ faddan) , Saturn 2 L faddan +Basagran 1.5 L/ fadddan , (3.63 and 3.34 ton/ faddan) and hand weeding twice gave grain yield of rice / faddan (3.59 and 3.57)in the first and second seasons while, the lowest grain yield (2.49 and 2.24 ton/ faddan) was resulted from the effect of Sakha 106 with untreated check in both seasons, respectively. Similar results were found by Vermani (1994) and Ntanos and Koutsoubos (2000).

For grain weight panicle (g), data revealed that grain weight panicle was significantly affected by the above- mentioned interaction. All weeded plots produced significantly heavier panicles than the unweeded one under all rice cultivars. Similar results were revealed by Shebl *et al.* (2009) and Abou EL-Darag (2012) Sakha 106 rice recorded the heaviest panicles when weeds were controlled by bispyribac + pyrzosulfuron (0.02 + 0.025 kg a.i. / ha.) +cultivars Sakha 106 rice with bispyribac + thiobencarb (0.03 + 1.8 kg a. i. / ha.) but, weed control treatment by bispyribac + pyrzosulfuron (0.02 + 0.025 kg a.i. / ha) with all cultivars, gave the highest panicle weight followed by cultivars Sakha 106 rice with bispyribac + thiobencarb (0.03 + 1.8 kg a i /ha.) compared to the other weed control treatments and cultivars.

Table 5. Rice grain yield t/ fed and same yield attributes affected by the interaction between, rice varieties and weed control treatments broadcasted seeded rice in 2016 season.

Treatments		Rate / faddan	Plant height (cm)	No. of tillers/ m^2	No. of panicles / m^2	Panicle length (cm)	Grain weight/ panicle (g)	1000-grain weight (g)	Grain yield (t/fad)
Sakha 106	1-Nominee		87.4	334.1	294.0	24.39	3.45	26.38	3.3163.4
	2-Saturn	800 cm	85.4	329.0	289.5	24.01	3.39	26.53	60
	3-Sirius.	2 L	82.3	317.0	279.0	23.14	3.28	26.56	3.360
	4-Basagran	80 g	80.8	311.1	273.8	22.71	3.21	25.98	3.537
	5- Inpul.	1.5 L	88.9	342.3	301.2	24.99	3.54	28.74	3.527
	6- Sirius+ Nominee	20 g	93.9	366.3	322.4	26.40	3.73	27.31	3.533
	7- Basagran +Nominee	80 g + 800 cm	95.9	369.2	324.9	26.95	3.81	25.25	3.410
	8-Inpul+ Nominee	1.5 L + 800 cm	101.1	389.5	342.8	28.43	4.02	26.95	3.957
	9-Sirius +Saturn	20 g + 800 cm	92.0	354.2	311.7	25.98	3.67	25.63	3.460
	10-Saturn+Basagran	20 g + 2 L	95.4	367.8	323.6	26.82	3.79	26.53	3.633
	11-Saturn +Inpul	1.5 L + 2 L	99.9	384.9	338.7	28.09	3.97	26.56	3.383
	12-Hand weeding twice	2 L + 20 g	102.6	395.2	347.8	28.84	4.09	25.45	3.583
	13- weedy check		60.5	220.7	194.2	16.09	2.27	18.71	2.490
Sakha 104	1-Nominee		77.9	300.0	267.3	21.90	3.10	24.88	3.000
	2-Saturn	800 cm	76.5	294.7	262.6	21.51	3.04	24.53	3.130
	3-Sirius.	2 L	74.6	287.3	259.5	20.97	2.97	25.06	3.043
	4-Basagran	80 g	72.9	282.8	255.6	20.50	2.90	25.77	3.200
	5- Inpul.	1.5 L	78.7	303.1	270.1	22.22	3.13	28.06	3.190
	6- Sirius+ Nominee	20 g	85.6	329.6	296.7	24.06	3.40	25.77	3.200
	7- Basagran +Nominee	80 g + 800 cm	87.4	336.6	302.9	24.57	3.47	23.83	3.083
	8-Inpul+ Nominee	1.5 L + 800 cm	82.7	318.6	287.0	23.25	3.29	25.41	3.583
	9-Sirius +Saturn	20 g + 800 cm	79.9	307.7	280.8	22.46	3.18	24.18	3.130
	10-Saturn+Basagran	20 g + 2 L	84.0	323.6	291.4	23.62	3.34	24.53	3.290
	11-Saturn +Inpul	1.5 L + 2 L	87.8	338.3	319.7	24.70	3.50	25.06	3.063
	12-Hand weeding twice	2 L + 20 g	89.1	343.2	325.8	25.04	3.55	24.00	3.2432.2
	13- weedy check		52.9	203.9	187.6	14.89	2.11	17.65	53
	L S D at 0.05		3.00	5.85	4.82	1.57	0.59	1.05	0.59

The interaction effect between weed treatments and rice cultivars significantly affected by number of tillers, the combination of Sakha 106 rice cultivar and the application 2017season Nominee +Inpul 0.8L+20g/ faddan at 12+14 DAS (T8) gave the highest value of tillers and number of panicle without significant differences 1000-grain weight, of the first and second seasons was highly significantly affected by the interaction between rice cultivars and weed control treatments (Table 5&6).

Table 6. Rice grain yield t/ faddan and yield attributes affected by the interaction between, rice cultivars and weed control treatments broadcasted seeded in season 2017

Treatments		Rate / faddan	Plant height (cm)	No. of tillers /m²	No. of panicles / m²	Panicle length (cm)	Grain weight/panicle (g)	1000-grain weight (g)	Grain yield (t/ faddan)
Sakha 106	1-Nominee		98.8	327.2	320.8	23.17	3.31	25.60	3.416
	2-Saturn	800 cm	97.3	322.1	315.8	22.81	3.26	25.20	3.497
	3-Sirius.	2 L	93.8	310.4	304.4	21.99	3.15	25.77	3.590
	4-Basagran	80 g	92.0	304.7	298.7	21.57	3.08	25.20	3.727
	5- Inpul.	1.5 L	101.2	335.2	328.6	23.74	3.39	27.90	3.783
	6- Sirius+ Nominee	20 g	108.4	358.7	351.7	25.08	3.58	26.47	3.570
	7- Basagran +Nominee	80 g + 800 cm	109.2	361.5	354.4	25.60	3.66	24.47	3.343
	8-Inpul+ Nominee	1.5 L + 800 cm	115.2	381.5	373.9	27.01	3.86	26.13	3.823
	9-Sirius +Saturn	20 g + 800 cm	104.8	346.8	340.0	24.68	3.55	24.87	3.296
	10-Saturn+Basagran	20 g + 2 L	108.8	360.1	353.1	25.48	3.64	25.20	3.833
	11-Saturn +Inpul	1.5 L + 2 L	113.8	376.8	369.5	26.69	3.81	25.77	3.407
	12-Hand weeding twice	2 L + 20 g	116.9	387.0	379.4	27.40	3.92	24.67	3.5702.2
	13- weedy check		65.2	216.1	211.9	15.95	2.22	18.17	46
Sakha 104	1-Nominee		88.7	293.7	288.0	20.80	2.97	24.13	2.966
	2-Saturn	800 cm	87.2	288.6	282.9	20.43	3.02	23.80	3.040
	3-Sirius.	2 L	84.9	281.3	275.8	19.92	2.85	24.33	3.120
	4-Basagran	80 g	83.6	277.0	271.5	19.48	2.78	25.00	3.236
	5- Inpul.	1.5 L	89.6	291.8	291.0	21.11	3.00	27.50	3.286
	6- Sirius+ Nominee	20 g	97.5	322.7	316.4	22.85	3.27	25.30	3.103
	7- Basagran +Nominee	80 g + 800 cm	99.5	327.6	323.1	23.67	3.34	23.10	2.903
	8-Inpul+ Nominee	1.5 L + 800 cm	94.2	308.0	305.8	22.08	3.15	24.67	3.323
	9-Sirius +Saturn	20 g + 800 cm	91.0	301.3	295.4	21.34	3.05	24.47	2.863
	10-Saturn+Basagran	20 g + 2 L	95.7	306.8	310.6	22.44	3.21	23.28	3.330
	11-Saturn +Inpul	1.5 L + 2 L	100.1	323.3	324.8	23.46	3.36	24.37	2.960
	12-Hand weeding twice	2 L + 20 g	101.5	336.1	329.5	23.79	3.41	23.26	3.103
	13- weedy check		60.3	199.7	195.8	14.81	2.06	17.78	1.950
	L S D at 0.05		3.66	6.88	6.59	1.76	0.67	1.17	1.46

Regarding 1000-grain weight, cultivars Sakha 106 rice produced the highest weight of 1000-grain when weeds were controlled by Nomini +Enpul 800 cm +20g / faddan at 14+12 DAS (T8). in the first season followed by Sakha 106 rice cultivar in the second season compared to the check.

Data in Table 5&6 show that grain yield t/fed as affected by the interaction between the rice cultivars and weed control treatments in 2016 and 2017 seasons. Grain yields were significantly affected by the interaction between rice cultivars and weed control treatments. All weed treated plots significantly produced higher grain yield than the check of both rice cultivars. Sakha 106 rice cultivars recorded the highest values of grain yield when weeds were controlled by Nominee +Inpul 800 cm +20g / faddan at 14+12 DAS (T8) followed by Sakha 104 rice cultivars with Sirius + Saturn treatment in 2017season. All the applied herbicide treatments showed great increases in rice grain yield as compared to the untreated check plots in both seasons of the study, because combined herbicides can control most the weeds, grassy and broadleaf weeds at the same time. Similar findings were reported by Shebl *at al.* (2009) and Abou El-Darag (2012).

4- Correlation between studied characters and rice grain yield:

Data presented in Table 7 indicated that the correlation between dry weight of monocot, dicot weeds species and grain yield of rice was statistically significant and negative at 5% level very and strong with dicot weeds species (- 0.132 and - 0.130) in 2016,. This means that, monocot weeds were more aggressive in their competition to rice than dicot weeds.

Table 7. The correlation coefficient between weeds, studied characters and rice grain yield during 2016 seseon.

Characters	Grain yield (t/faddan)	1000-grain weight (g)	Panicle weight(g)	No. of panicles /m²	No .of tillers/m²	Plant height (cm)
Grain yield (t/faddn)	0.957* *	0.957**	0.947**	1.000*	1.000**	1.000**
1000-grain weight (g)	0.957**	0.946**	0.999**	0.999**	1.000**	-
Panicle weight(g)	0.957**	0.947**	1.000**	1.000**	-	-
No. of panicles /m²	0.955**	0.947**	1.000**	-	-	-
No .of panicles /m²	0.956**	0.947**	0.947**	-	-	-
No .of tillers/m²	0.971**	-	-	-	-	-
Monocot	-0.132	-0.117	-0.132	-0.132	-0132	-0.122
Dicot	-0.130	-0119	-0.132	-0.130	-0130	
Total weeds at (60 DAS)	-0.113	-098	-0.111	-0.132	-	-
Monocot	-0.119	-0.108	-0.122	-	-	-
Dicot	-0.119	-0.060	-	-	-	-
Total weeds at (75 DAS)	-0.122	-	-	-	-	-

***and NS indicated to significant and not significant at <0.05respecitively.**

These results were attributed to the increases in yield components namely number of panicles/m2, grain weight g/ panicle and 1000 grain weight, where the results in Table 7 of correlation exerted significant correlation between rice grain yield t/ faddan and negative correlation between all the above mentioned characters and total weeds. The increasing in rough rice yield is sowing to elimination weed competition by the herbicide combination and improving net assimilation rates, where plant assimilation translocate and stored in rice grains. Similar results were obtained by Yousefnia *et al*. (2012) indicated that herbicide application & hand weeding once had negative and significant correlation (- 0.47*) with grain yield. Panicles number / square meter had very high and positive correlation (0.94*) with grain and biological yield. As a result, number of panicles / square meter is considered as the most important and the most effective trait in increased due to type of weed competition were positively contributed to the increase, plant height, panicle length, grain weight/ panicle, 1000-grain weight .

5- Economic feasibility:

Data in Table 8 and figures 1, 2 and 3 show that the differences among all studied economic criteria as affected by the weed control treatments and their interactions through two rice seasons.

Gross income were significantly increased by the herbicidal treatments and more than hand weeding twice. The highest net income (LE/faddan) was obtained by Inpul 20g / fed+ Nominee 800 cm / faddan which gave 5737and 4486 (LE/faddan) followed by Saturn 2 L/ faddan + Inpul 20g / faddan which gave 3849 and 3475 (LE/faddan) in both seasons.

The highest probability were obtained from herbicidal combinations treatments more than, hand weeding twice and untreated check during, 2016 and 2017 seasons. The increase in probability was Sakha 106 rice cultivars with Inpul 20 g/faddan+ Nominee 800 cm/faddan and Saturn 2 L faddan +Inpul 20 g/faddan 47.2, 50.4% and 28.0, 35.9%, respectively in both seasons.

The increases of partial costs were obtained with hand weeding twice and reached to 6540 and 7170 LE/ faddan in the first and the second seasons, respectively, while the reduction were obtained with untreated check(5040 and 5520 LE/ faddan) in both seasons, respectively. Benefit/cost ratio grades were obtained with, the use Inpul 20 g/faddan Nominee 800 cm /faddan, Saturn 2 L/ faddan + Inpul 20 g/faddan 50.9, 54.3 and 66.063.4%, respectively through two seasons, in the first and second season as compared with untreated check.

Table 8. The mean of economic parameters of two rice cultivars as effected by herbicides treatments of weeds on broadcasted seeded rice quality on economic analysis in 20l6 and 2017 seasons.

Cultivars	Seasons	2016 season					2017 season				
	Treatments	Total cost LE/ faddan	Gross income LE/ faddan	Net income LE/ fa ddan	Probability	benefit	Total cost LE/ faddan	Gross income LE/ faddan	Net in come LE/ fa ddan	Probability	benefit
Sakha 106	1-Nominee	5390	13264	7874	2.46	1.46	5870	13664	7794	2.33	1.33
	2-Saturn	5300	13840	8540	2.61	1.61	5880	13988	8108	2.38	1.38
	3-Sirius.	5240	13440	8200	2.56	1.56	5720	14360	8640	2.51	1.51
	4-Basagran	5325	14148	8823	2.66	1.66	5705	14908	9203	2.61	1.61
	5- Inpul.	5200	14108	8908	2.71	1.71	5680	15132	9452	2.66	1.66
	6- Sirius+ Nominee	5590	14132	8542	2.53	1.53	6070	14280	8210	2.35	1.35
	7- Basagran +Nominee	5675	13640	7962	2.40	1.40	6155	13372	7217	2.17	1.17
	8-Inpul+ Nominee	5550	15828	10278	2.85	1.85	6030	15292	9262	2.54	1.54
	9-Sirius +Saturn	5500	13840	8340	2.52	1.52	5980	13184	7204	2.20	1.20
	10-Saturn+Basagran	5585	14532	8947	2.60	1.60	6065	15332	9267	2.53	1.53
	11-Saturn +Inpul	5460	13532	8072	2.48	1.48	5940	13628	7688	2.29	1.29
	12-Hand weeding twice	6540	14332	7792	2.19	1.19	7170	14280	7110	2.00	0.99
	13- weedy check	5040	9960	4920	1.98	0.98	5520	8984	3464	1.63	0.63
Sakha 104	1-Nominee	5390	12000	6610	2.23	1.23	5870	11864	5994	2.02	1.02
	2-Saturn	5300	12520	7220	2.36	1.36	5880	12160	6280	2.07	1.07
	3-Sirius.	5240	12172	6932	2.32	1.32	5720	12480	6760	2.18	1.18
	4-Basagran	5325	12800	7475	2.40	1.40	5705	12944	7239	2.27	1.27
	5- Inpul.	5200	12760	7560	2.45	1.45	5680	13144	7446	2.32	1.31
	6- Sirius+ Nominee	5590	12800	7210	2.29	1.29	6070	12412	6342	2.05	1.05
	7- Basagran +Nominee	5675	12332	6742	2.17	1.19	6155	11612	5457	1.89	0.89
	8-Inpul+ Nominee	5550	14332	8782	2.58	1.58	6030	13292	7262	2.20	1.20
	9-Sirius +Saturn	5500	12520	7020	2.28	1.28	5980	11452	4572	1.92	0.92
	10-Saturn+Basagran	5585	13160	7575	2.36	1.36	6065	13320	7255	2.20	1.20
	11-Saturn +Inpul	5460	12252	6792	2.24	1.24	5940	11840	5900	1.99	0.99
	12-Hand weeding twice	6540	12972	6432	1.98	0.98	7170	12412	5242	1.73	0.73
	13- weedy check	5040	9120	4080	1.81	0.81	5520	7800	2280	1.41	0.41
	L S D at 0.05	1977.1	419.2	338.1	1.39	0.88	1981.9	436.3	349.4	1.84	0.94

***DAS=days after sowing *LE=Egyptian Pound**

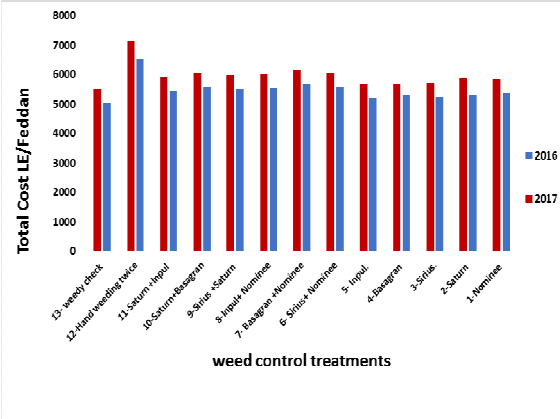

Fig. 1. The relationship between effect of mean rice cultivars and weed control treatments on gross total cost during the two seasons.

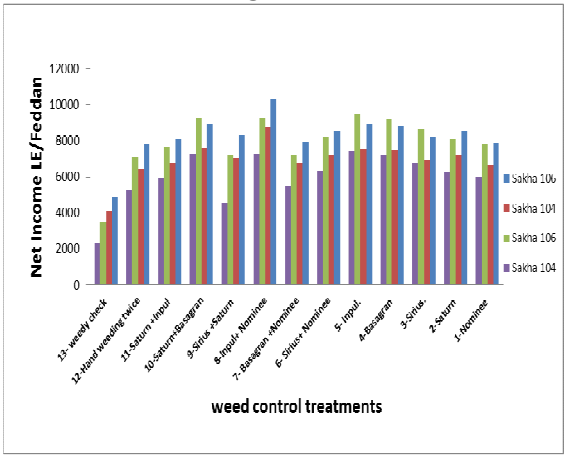

Fig. 2. The relationship between effect of mean rice cultivars and weed control treatments on gross net income during the two seasons.

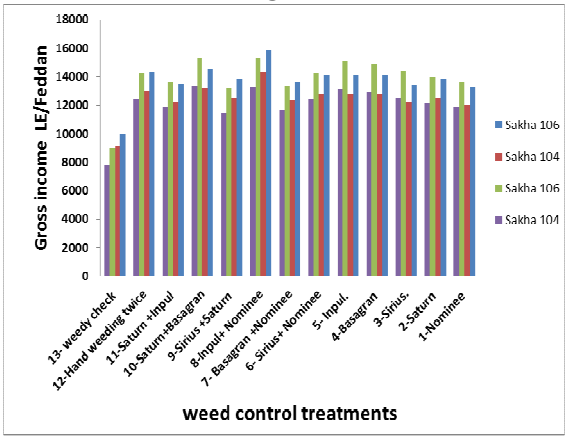

Fig. 3. The relationship between effect of mean rice cultivars and weed control treatments on cross income during the two seasons.

On the other hand, the results of the interactions between rice cultivars and the herbicidal treatments on gross income, net income and probability% were fluctuated but are still superior than hand weeding twice and less than obtained with Sakha 106 rice cultivars in both seasons. These results are in agreement with those obtained by, (Adigun *et al*., 2005; Singh *et al*., 2006; Mann *et al*., 2007; Singh et *al*., 2008)a and Mahajan *et al*., 2009). It could be concluded that the best and effective weed control treatment for controlling weeds in broadcasted rice in Egypt is to manage weeds by herbicides combinations to prevent long weed interference through the critical periods of weed competition in such rice plantations than manual weeding with use Sakha 106 cultivar either Sakha 106 or Sakha 104 cultivar condition the field which cultivated with.

REFERENCES

Abdel-Razek, U.A.; R.A.El-Refaey, S.M Shabl and S.S. M. Abd El –Naby (2014). Integrating allelopathy, plant population and use of herbicides for weed control of six rice genotypes. Asian J. Crop Sci.,6(1):1-14.

Abou EL-Darag (2016). Efficiency of some herbicides and rice hybrids against weeds in broadcast-seeded rice. Proceeding, The Sixth Field Crops Conference, FCRI, ARC, Giza, Egypt, 22-23 Nov: 201-208.

Abou El- Darag, I. H. (2012). Integrating agricultural and chemical methods for efficient weed control and high yielding in drill- seeded rice. J. Plant Production, Mansoura Univ., 3 (4): 655- 664.

Ampong- Nyarko, and De Data (1991). A handbook for weed control in rice International Rice Res. Inst. P. O. BOX 933, Manila Philippines, pp. 113.

Ashry, M.A. 1; A. A. Zein ; M. F. El - Nady and Sh. M. Abdel-Dayem (2012) Effect of potential allelopathic Egyption rice cultivars against *Echinochloa crus-galli* and *Echinochloa colonum*. J. Plant Prot. and Path., Mansoura Univ., Vol. 3 (7): 629 – 644.

Bheru, L. ;V. G. Chavan; V.A. Rajemahadik; V.M. .Dhopavkar; H. K Ameta and R.N. Tilekar (2016). Effect of different rice establishment methods on growth, yield and different varieties during kharif season. International J. of Plant and environment sciences. Vol. 6,2 p. 127-131.

Cavanna, S. ; L. Bacci; D. Larelleand and A. Carone (2004).Penoxsulam: New post-emergence rice herbicide.Giornate-Fitopatologische-2004,-Montesilvano-Pescara,-4-6-maggio-2004-Atti,-volume-primo: 301-307(C.F. computer search).

Dunan, C.M.; E.E. Schweizer; D. L. Becker and F. D. Moove (1995). The concept and application of early economic period threshold: The case (*Allium cepa*). Weed Sci., 43(3):634 – 639.

EL- Namaky, R. A. A. (2007). Genetic studies on using wide compatibility gene in hybrid rice breeding. Ph. D. Thesis, Fac. Agric. Mansoura Univ, Egypt.

Gomez, K.A. and A.A. Gomez (1984). Statistical procedures for agricultural research. John Wiley and Sons, Inc. New York.

Heady, E.O. and J. L. Dillon (1961). Agricultural production function. Library of congress catalog card number: 60- 1128, Iawa state university press.

Jackson, M.I. (1958). Soil chemical analysis prentice Hall, Inc. Englewood Cliffe, N.J. Hunt, R. (1978). Plant growth analysis. London: Edward Arnold, 67 p.

Jamshid, S.H.; Y. Bijan; M. A. Baghestani and F. Majidi (2012). Effect evaluation of rice (*Oryza sativa*) general herbicide on yield and yield component in intermission flooded conditions. International Res. J. of Applied and Basic Sci.; 3 (3): 450 – 460.

Mahajan, G.; B.S. Chauhan and D. E. Johnson (2009). Weed management in aerobic rice in Northwestern Indo-Gangetic Plains. J. Crop Impr., 23: 366-382.

Mousa, R.A. and T. Noreldin(2015).Effect of water depth, two rice cultivars and some herbicides on weeds and direct- seeded rice(*Oryza sativa* Linn.).J. Agric. Research., Alexandria Univ., 60 (3): 283-301.

Metwally, I.O.E.; A.M. Abd El-All and E. M. A. Gaber (1994). Growth and yield of rice as affected by fertilizer treatments and the preceding winter crops. J. Agric. Sci. Mansoura Univ., 19(3): 891-901.

Ntanos, D.A. and S. D. Koutsoubas (2000). Competition of barnyard grass with rice varieties. J. Agronomy and Crop Sci., 14, 241- 246.

Shebl, S. M.; I. H. Aboa EL-Darag and H. F. E-Mwafi (2009). Effects of varietals performance and weed control efficacy on weeds, growth and yield of hybrid rice . J. Agric. Res, Kafr EL- Sheikh Univ., 35 (1): 127- 148.

Singh, S.; J.K. Ladha; R.K. Gupta; L. Bushan and A.N. Rao (2008a).Weed management in aerobic rice systems under varying establishment methods. Crop Prot., 27: 660-671.

Singh, S.; L. Bhushan; J.K. Ladha; R.K. Gupta; A.N. Rao and B. Sivaprasad (2008b). Weed management in dry seeded rice (*Oryza sativa*) cultivated in the furrow irrigated raised bed planting system. Crop Prot., 25: 487-495.

Tagour, R. N. H.; L. E. Soliman and R. A. Mousa (2016). Effect of preceding winter crops and herbicidal combinations on weeds, yield and economic of broadcasted-seeded rice productivity. J. Plant production, Mansoura Univ., 7 (5): 510-515.

Talbert, R. E. and N. R. Burgos (2007). History and management of herbicide-resistant barnyard grass (*Echinochloa crus-galli*) in Arkansas Rice. Weed Technology, 21: 324–331.

Vermani, S. S. (1994) Hybrid rice technology new developments on future prospects, selected papers from the International Rice Research Institute. Conf. IRRI. P. O. Box 933. Manila 1099, Philippines.

Yousefnia ,H.; R. T. koloor and S. J. Hashemi (2012). Effects of weed control methods on yield and yield components of Iranian rice. Australian J. of Agric. Engineering, 3(2): 59 – 64.

Zhang, W.; E. P. Webster; D. C. Blouin and C. T. Leon (2005).Fenoxaprop interactions for barnyard grass (*Echinochloa crus-galli*) control in rice. Weed Technology,19 (2):293-297.

تأثير صنفين من الأرز وتوليفات مبيدات الحشائش علي الحشائش والمحصول و الجدوى الاقتصادية لإنتاجية الأرز البدار

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يتوجه المزارعين فى هذه الايام الى زراعة الارز البدار بدلا من الارز الشتل رغم ان الأرز البدار غالى التكلفة فى مكافحة الحشائش حيث يعانى من خطورة تنافس الحشائش و يجب استحداث حزمة توصيات كى تطبق فى حقول الارز البدار والتى تحتوى على مبيدات جديدة وقديمة لمكافحة الحشائش لحل هذه المشكلة. لهذا أقيمت تجربة حقلية بالمزرعة البحثية لمحطة بحوث سخا , لتقييم فاعلية صنفى من الارز و بعض مبيدات الحشائش وتوليفاتها لمعرفة تأثيرها على الحشائش والمحصول تحت ظروف الزراعة البدار خلال موسمي الزراعة 2016 و 2017. استخدم تصميم القطع المنشقة ذو اربعة مكررات فى تنفيذ التجربة خلال موسمى الدراسة. وزعت فى القطع الرئيسية صنفى الأرز سخا 106 , سخا104 ووزعت فى القطع الشقية معاملات مكافحة الحشائش و هى : نومينى 2% بمعدل 800 سم/ فدان ، ساتيرن 50% بمعدل 2 لتر/فدان ،سيريس 10% بمعدل 80 جرام/فدان، بازجران 48% بمعدل 1.5 لتر/فدان, أنبول 75% بمعدل20 جرام/ فدان، سيريس 10% بمعدل 80 جرام/فدان + نومينى 2% بمعدل 800 سم فدان، بازجران 48% بمعدل 1.5 لتر/فدان +نومينى 2% بمعدل 800 سم / فدان ، أنبول 75% بمعدل 20 جرام/فدان+ نومينى 2% بمعدل 800 سم فدان+، سيريس 10% بمعدل 80 جرام/فدان + ساتيرن 50% بمعدل 2 لتر/فدان ، ساتيرن 50% بمعدل 2 لتر/فدان + بازجران 48% بمعدل 1.5تتر /فدان ، ساتيرن 50% بمعدل 2 لتر/فدان + أنبول 75% بمعدل 20 جم /فدان، ،النقاوة يدوية مرتين و معاملة الكنترول . أوضحت النتائج أن تاثير صنف سخا 106 يستطيع ان يشارك بنسبة 24.9و25.0% خفض في وزن الحشائش و زيادة فى انتاجيه المحصول طن/فدان بنسبة 10.55 و 15.09 % مقارنة بالصنف 104 فى الموسمين2016 ,2017 على الترتيب. وهذا يعزى الى النمو القوى للصنف سخا 106 والذى يوحى الى ان هذا الصنف اكثر طولا واكثر تفريع وسريع النمو ليغطى سطح التربة وبعض الحشائش ويثبطها مقارنة بالصنف سخا 104. وعلى الجانب الاخر كل المبيدات الفردية والمركبة والنقاوة اليدوية نجحت فى مكافحة الحشائش وبادة فى محصول الارز بالطن /فدان وهذا يعزى الى تجنب الحشائش الكامل وبناء على ذلك يزيد انتفاع الارز من المصادر الطبيعية الضوء و المكان مقارنة بالكنترول الاكثر عدوى بالحشائش. كما أن التداخل بين تاثير اصناف الأرز و المبيدات يستطيع أن تكافح الحشائش بقوة وزيادة الحصول طن /فدان مقارنة باستخدام العامل الفردى. والتحليل الاقتصادى لهذه الدراسة للخروج بحزمة توصيات لادارة الحشائش حيث تظهر بوضوح تحت ظروف مزارعى كفر الشيخ والتى تستطيع ان تزيد الدخل بزراعة الصنف 106 مع المبيدات المدروسة لادارة الحشائش فى الارز البدار. كما أكدت النتائج أن صنف الأرز سخا 106 و معاملات توليفات مكافحه الحشائش مثل أنبول 75% بمعدل 20 جرام/فدان + نومينى 2% بمعدل 800 سم / فدان ، بازجران 48% بمعدل 1.5لتر /فدان + نومينى 2% بمعدل 800 سم / فدان ، سيريس 10% بمعدل 80 جرام/فدان + ساتيرن 50% بمعدل 2 لتر/فدان، سيريس 10% بمعدل 80 جرام/فدان + نومينى 2% بمعدل 800 سم / فدان، ساتيرن 50% بمعدل 2 لتر/فدان + أنبول 75% بمعدل 20 جم /فدان و النقاوة يدوية مرتين خفضا في الوزن الجاف للحشائش الكلية بنسبة 85.5،86.7،88.8،88.9و75.3 % على الترتيب مقارنة بمعاملة الكنترول فى الموسم الأول ، بالأضافة الى 87.2،87.1،87.7،87.1و85.9 %على الترتيب فى الموسم الثانى. كما أوضحت النتائج أن هناك زيادة فى محصول الحبوب (طن/فدان) و مكوناته مثل عدد الأشطاء ، عدد الداليات/م^2 ، ارتفاع النبات ، طول الدالية ، وزن حبوب الدالية، وزن الأف حبة, و محصول الارز بالطن/فدان خلال موسمي الزراعة. كما سجل ناتج المحصول للفدان أعلى صافي للربح فى هذه الدراسة باستعمال توليفات مبيدات الحشائش مع الصنف سخا 106 عن الصنف سخا 104. من هذه الدراسة نوصى باستعمال توليفات مبيدات الحشائش مع زراعة الصنف سخا 106 وان افضل التوليفات البديلة للنقاوة اليدوية مرتين هى باستخدام مبيدى أنبول + نومينى لاعطاء مكافحة ممتدة للحشائش خلال الموسم حتى 75 يوم من الزراعة و زيادة محصول الأرز طن / فدان . كما يتضح أن استعمال باقى توليفات المبيدات المذكورة في هذه الدراسة كانت ذات فعالية لمكافحة انتشار الحشائش في الارز البدار.