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Effect of nitrogen rates and seedling age on the productivity of some promising hybrid rice combinations

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Abstract

This experiment was conducted at Experimental Farm of Rice Research Department at Sakha Agriculture Research Station, Sakha, Kafr EL Sheikh, Egypt during 2014 and 2015 rice growing seasons to study the effect of seedling ages and nitrogen rates on the productivity of two Egyptian hybrids combinations, Egyptian hybrid 1 and new hybrid combination SK2151 H on different characters. A split split-plot design with three replications was used. The main plot was devoted to hybrid rice combinations, while the seedling age were arranged in the sub plots and nitrogen rates were assigned in the sub–sub plots with three replications. Four rates of nitrogen (zero, 55, 110 and 165 kg N/ha) and three seedling ages (20, 25 and 30 days), were used, The date of sowing was at 1st May of each season. The data were recorded on plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility %. Results showed that, the high rate of nitrogen significantly influenced on plant height (cm),panicles hill^{-1}, panicle weight(g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%), The highest grain yield (13.600 tha^{-1}) resulted from 20 days seedling age and 165 kg nitrogen per hectare for the Egyptian hybrid 1 in the second season. While, the lowest grain yield (4.230 tha^{-1}) was recorded without application of nitrogen fertilizer (control) with seedling age of 30 days for SK 2151H in the first season.

Key words: Hybrid combination, seedling ages, nitrogen rates and grain yield.

Introduction

In Egypt the average national yield level of rice has to be increased by 25 – 30 % to meet the demands of the increasing population. This seems difficult considering the narrow gap between yield potential and actual yield (10.5 tha^{-1}) in 2013. Among available technologies to increase yield above the present ceiling, is the exploitation of heterosis in hybrid rice, which appears to be the practical approach for Egypt (Bastawisi *et al*. 1998). The seedling age of rice plants is conventionally expressed in calendar days after germination or seedling. However, the calendar days are much affected by the environment. Several experiments were conducted to study the optimum rice seedling age and concluded that, 25-30 days is the optimum seedling age under all sowing dates regardless of variety and locations (Rice Research Training Center Sakha, Kafr El-Sheikh, Egypt, 2002). Seedling age plays an important role in enhancing the yield of rice. Age of seedling is a key factor which influences the tillers production, grain formation and other yield contributing parameters. It is the main factor for uniform stand establishment of rice which controls its growth and yield. The use of appropriate aged seedlings for transplanting and its timely planting are important non-cash inputs for attaining the higher yield of rice. Seedling vigor contributes to successive tillering, yield and quality of transplanted rice. Growth and production of rice depend on timely cultivation and growth duration of cultivar which is affected by age of seedlings at transplanting. All the above and below ground morphological characters of rice plants were varied with seeding rate, age of seedling and growing environment. Nitrogen plays a key role in rice production as it is required in huge amount. (Waghmode *et al*, 2008), found that, the mean devotions of delayed 50 % flowering from the recommended age of transplanting (25 days old) was highest for transplanting 40-day old seedlings (by 7.50,7.12and 7.63 days for A, B, and R lines, respectively) flowed by 3 days – old seedling (4.88,4.75 and 5.00 days), 30-days – old seedling (2.25, 2,00 and 2.25 days) and 20 days – old seedlings (2.25, 2.00 and 2.50 days).The 50 % flowering was delayed in seedling that were younger or older than the seedling with optimum age (25 days old).The complete synchronization of flowering in IR 58025A and B was obtained by 3 staggered sowing of plants during transplanting, the synchronization in A and R line was achieved by 3 staggered sowing of R line at 5days intervals on the 1st , 6th and 11th day of the month, and of A line on the 23 days of the month due to the effect of overage seedlings of R line at transplanting . So; this investigation was conducted to study the effect of nitrogen fertilizer rates and seedling age on the productivity of some promising rice hybrids.

Materials and Methods

This experiment was conducted at Experimental Farm of Rice Research Department at Sakha Agriculture Research Station, Sakha, Kafr EL Sheikh, Egypt, during 2014 and 2015 rice growing seasons

to study the effect of nitrogen rates (zero, 55, 110 and 165kg N / ha) and three seedling age (20, 25 and 30 days) for two hybrid rice combination, Egyptian hybrid 1 and new hybrid combination SK2151 H on plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield(tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%). The date of sowing was on 1st May of each season. Seedlings were transplanted in plots 3 x 5 m in dimensions at 20 x 20 cm planting spacing among hills and rows at the rate of 3 seedlings / hill, Nitrogen fertilizer as urea form 46 % N was applied at 55, 110 and 165 kg / ha as follows:1/3 basal in the dry soil during land preparation before flooding, 1/3 at panicle initiation (30 days after transplanting) and the last dose (1/3) was applied seven days before heading (66 days after transplanting). A split- split plot design with three replications was used. The main plot was devoted two hybrids. While the seedling ages were arranged in the sub - plot and nitrogen rates was assigned in the sub – sub plots. Observation were recorded on ten plants plots^{-1} taken at random from each hybrid rice combinations in each replication for plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%). The data were collected according to Standard Evaluation System of IRRI 2014, for all the studied characters, all cultural practices were followed as recommended. The data were analyzed following the ANOVA technique and the mean differences were adjusted by the Duncan's Multiple Range Test, Gomez and Gomez, 1984, using a statistical computer package MSTAT.

Results and Discussion

The results in Table (1) revealed that, the effect of hybrid rice combinations, seedling age and nitrogen fertilizer, as well as, their interaction on plant height (cm), panicles hill^{-1}, panicle weight(g), panicle length(cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%). The results showed that, all traits were highly significant affected by hybrid combinations during the two seasons. The highest values were plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), harvest index (%) and spikelet fertility (%) were102.30 (cm), 21.20 hill^{-1}, 4.29 (g), 22.68 (cm), 10.36 (tha^{-1}), 48.13(%) and 96.52 (%) for the seven traits in the second season, respectively. With Egyptian hybrid 1. While the lowest values for these traits obtained when used the hybrid Sk2151H during 2014 season. The highest value of 1000-grain weight was 26.53 (g) with using the hybrid SK2151H during season of 2015, while the lowest value was 25.23 (g) obtained from using the Egyptian hybrid 1 during 2014 season. This revealed the effect of seedling ages influence on plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%). Were highly significant affected by seedling age during the both seasons, the highest values were 100.59 (cm), 22.54 (hill^{-1}), 4.48 (g), 23.06 (cm), 10.656 (tha^{-1}), 27.23 (g), 50.20 (%) and 97.00 (%) for mention traits, respectively with using 20 days of seedling age during 2015 season. While the lowest values obtained when using the seedling age 30 days during 2014 season.

Faghani *et al*, (2011) found the significant effect of seedling age on tillering pattern, maximum tillers hill−1 (16.3) were recorded by transplanting 25 days old seedlings while 35 days old seedlings gave minimum tillers hill−1 (15.3) on the other side, Molla (2002) . Found that, twenty-eight days old seedling produced more tillers, panicles/ m^2 and grain yield than 21- day's old seedling.

Also, there were significant differences among the nitrogen rates for the studied characters, plant height(cm), number of panicles hill $^{-1}$, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%). in both seasons. The highest values were 108.77 (cm), 26.83 hill $^{-1}$, 4.80 (gm), 24.50 (cm), 11.780 (tha^{-1}), 27.94 (g), 53.26 (%) and 98.02 (%) for all traits in the second season, respectively with using the rates of 165kg N/ha. But the lowest values obtained for zero nitrogen rates for all traits during 2014 season.

Also, the result shown in Table (1) indicates that, all interactions among the three factors were highly significant for all the studied traits during the two seasons.

The results in (Table 2) indicated that, the Egyptian Hybrid 1 with the seedling age of 20 days gave significantly higher values for plant height (cm), number of panicles hill $^{-1}$, panicle weight (gm), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (gm), harvest index (%) and spikelet fertility (%) were 104.10 (cm), 23.11 hill $^{-1}$, 4.70 (g), 23.53(cm), 11.343 (tha^{-1}), 51.22 (%) and 96.28 (%) for these traits in the second season, respectively, with Egyptian Hybrid 1 under recorded old seedling 20 days. While, significantly lowest values were detected as a result of 30 days old seedling under with hybrid SK2151H for these traits in both seasons. The highest value of 1000-grain weight was 26.75 (g) when using seedling age of 20 days with the hybrid rice combination SK2151H during season 2015, but, the lowest value was 22.95 (g) obtained by of 30 days seedling age with Egyptian Hybrid 1 during 2015 season.

Table 1. Effect of hybrid combination, seedling age and nitrogen rates, as well as, their interaction on plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight(g), harvest index (%) and spikelet fertility (%).

Main effect and interaction	Plant height (cm)		Panicals hill^{-1}		Panicle weight (g)		Panicle length (cm)		Grain yield (tha^{-1})		1000-grain weight (g)		Harvest Index (%)		Spikelet fertility (%)	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Hybrids																
Egyptian Hybrid 1	100.03a	102.30a	19.85a	21.20a	4.002a	4.29a	21.82a	22.68a	9.540 a	10.361a	25.23b	25.73b	41.81a	48.13a	94.40a	96.52a
SK2151 H	94.08b	96.16b	18.68b	20.08b	3.57b	3.87b	21.21b	21.74b	8.580 b	9.221b	25.91a	26.53a	40.86b	46.29b	93.65b	95.66b
F-test	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Seedling ages																
20 days	98.45a	100.59a	20.99a	22.54a	4.11a	4.48a	22.10a	23.06a	10.027a	10.656a	26.09a	27.23a	43.02a	50.20a	95.01a	97.00a
25 days	96.97b	99.45a	19.36b	20.64b	3.80b	4.05b	21.56b	22.25b	9.079b	9.808b	25.68b	25.67b	41.33b	46.92b	94.29b	96.30b
30 days	95.74c	97.64b	17.45c	18.75c	3.44c	3.71c	20.88c	21.33c	8.087c	8.908c	24.93c	25.00c	39.65c	44.51c	92.78c	94.96c
F-test	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
N-rates (kg N/ha)																
0	89.31d	91.10d	11.67d	13.23d	3.27d	3.46d	17.77d	19.11d	5.00d	5.800d	24.27d	24.80d	32.12d	32.56d	91.95d	94.02d
55	94.36c	96.09c	17.84c	18.74c	3.48c	3.65c	21.76c	22. 14c	9.730c	10.510c	25.13c	25.30c	42.89c	51.06c	93.07c	95.28c
110	99.21b	100.95b	22.03b	23.78b	3.96c	4.42b	22.57b	23.11b	10.470b	11.060b	25.98b	26.70b	44.16b	51.95b	95.04b	97.05b
165	105.33a	108.77a	25.52a	26.83a	4.43a	4.80a	23.96a	24.50a	11.040a	11.780a	26.90a	27.94a	46.18a	53.26a	96.03a	98.02a
F-test	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Interaction																
H×S	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
H×N	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
S×N	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
H×S×N	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

** : highly significant at the 1% level of probability .In each season, the values having the same letter(s) not significantly differed according to Duncan's multiple range test.

Table 2. Plant height (cm), panicles hill $^{-1}$, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%) as affected by the interaction between, hybrid and seedling ages during 2014 and 2015 seasons.

Hybrids	Seedling ages (day)	Plant height (cm)		Panicles hill^{-1}		Panicle weight (g)		Panicle length (cm)		Grain yield (tha^{-1})		1000-grain weight (g)		Harvest Index (%)		Spikelet fertility (%)	
		2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Egyptian Hybrid 1	20	101.5	104.10	21.48	23.11	4.30	4.70	22.36	23.53	10.670	11.343	25.60	24.23	43.64	51.22	94.32	96.28
	25	100.40	102.39	19.72	21.06	4.04	4.24	21.81	22.74	9.587	10.392	25.25	23.92	41.81	48.07	94.13	96.17
	30	98.19	100.41	18.33	19.47	3.66	3.95	21.30	21.77	8.372	9.347	24.84	22.95	39.99	45.1	92.49	94.52
SK2151H	20	95.40	97.08	20.50	21.97	3.92	4.27	21.85	22.60	9.383	9.970	26.59	26.75	42.41	49.17	95.70	97.73
	25	93.55	96.52	18.97	20.23	3.57	3.86	21.32	21.75	8.571	9.224	26.11	26.1	40.85	45.77	94.44	96.43
	30	93.29	94.87	16.57	18.04	3.22	3.48	20.47	20.89	7.803	8.469	25.03	25.4	39.32	43.93	93.06	95.4
LSD 0.05		0.6	0.7	0.02	0.02	0.02	6.6	0.01	0.01	0.02	0.02	0.02	2.2	0.01	6.57	0.1	5.8
LSD 0.01		0.8	0.1	0.03	0.03	0.03	9.5	0.02	0.02	0.03	0.03	0.03	3.2	0.02	9.51	0.2	8.4

* and **significant differences at 0.05 and 0.01 level of probability respectively.

Sarkar *et al*, (2011) found significant effect of seedling age of panicle length, they recorded more panicle length (27.98 cm) from seedlings of 25 days age. While minimum (27.36 cm) from older seedlings of 35 days. (Prabha *et al*, 2011) reported that, more panicle length (24.1 cm) by transplanting younger seedlings of 14 days age compared with older seedlings of 21 days which received minimum panicle length of 18.8 cm in system of rice intensification, IRRI (2014), reported that, transplanting at 21- day-old seedling ensures timely heading and flowering of parental lines. Transplanting older seedling delays flowering by about half the number of days by which the seedling are older than 21days.it transplanting younger seedling advanced flowering by approximately half the number of days by which the seedling are younger than 21 days. It transplanting the B or R line seedling by the same number of days synchronize flowering.

The results listed in Table (3) indicates that, the Egyptian Hybrid 1 and 165kg N/ha interaction revealed that significantly highest values for plant height(cm), panicles hill $^{-1}$, panicle weight (gm), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%) in both seasons, where the values were 110.37 (cm), 28.02 (cm), 5.17 (gm), 25.06 (cm), 12.323 (tha^{-1}), 51.16 (%) and 97.90 (%) in the second seasons , respectively. While, the significantly lowest values were detected as a result of the hybrid SK 2151H without nitrogen application interaction for these traits in both seasons. Also, the highest value of 1000-grain weight was 28.17 (g) when using 165kg N /ha with the hybrid cross SK 2151H during season 2015, but, the lowest value was 23.90 (g) obtained by without application nitrogen when interacted with Egyptian Hybrid 1 during 2014 season.

The results in Table 4. Indicates that, the seedling age 20 days x 165kg N /ha interaction revealed the significantly highest values for the all traits in both seasons. Where the values were: 110.06 (cm), 29.0 hill^{-1}, 5.50 (g), 26.35(cm), 12.700 tha^{-1}, 28.7 (cm), 53.75 (%) and 99.1 (%) in the second season, respectively. While, the significantly lowest values were detected as a result of the 30 days seedling age and 0 kg N /ha interaction for the all traits in both seasons. Pramanik and Bera, 2013, evaluated hybrid rice to three levels of seedling age and five levels of nitrogen. They observed that 1000-grain weight affected significantly by different seedling age and nitrogen rates. Young seedlings of 10 days age produced maximum thousand grain weight 23.80 g while minimum 22.86 g was recorded from older seedlings of 30 days age. Thousand grain weight increased gradually with increase in nitrogen rate from 0 to 150 kg·ha^{-1} maximum 1000-grain weight 24.11 (g) was obtained with the application of 150 kg N .ha^{-1} and it decreased (to 23.87 g) with further increase in nitrogen up to 200 kg·ha^{-1}.

The results in Table 5. Indicates that, second order interaction of the hybrid combination Egyptian Hybrid 1 x 20 days seedling age and the N rate of 165 kg / ha revealed significantly highest values of plant height (cm), panicles hill $^{-1}$, panicle weight (gm), panicle length (cm), grain yield (tha^{-1}), harvest index (%) and spikelet fertility (%) during the two seasons. The highest values were 112.31(cm), 30.13 hill $^{-1}$, 5.90 (g), 26.30 (cm), 13.600 (tha^{-1}), 51.2 (%) and 99.01 (%) for the seven traits in the second season, respectively. While the lowest values for these traits obtained when detected as a result of 30 days seedling age, hybrid SK2151 H and 0 kg N/ha. The highest value of 1000-grain weight (g) was 29.40 (g) was detected with hybrid SK2151H x 20 days seedling age and the N rate of 165kg /ha. During season 2015, the lowest value was 23.9 (g) obtained from using the Egyptian Hybrid 1, seedling age 30 days and 0 kg N/ha during 2014 season. Kaushal *et al***,** 2010, recorded taller plants 115.6 cm when nitrogen was applied at 150 kg ha^{-1} while minimum 104.1 cm was obtained in case of 90 kg·N·ha^{-1}. Ehsanullah *et al*, 2012, reported that plant height had increased gradually with the increase in nitrogen fertilization to Basmati rice. Maximum plant height 107.60 cm was recorded when nitrogen was applied at 125 kg·ha−1, while minimum plant height was 100.6 cm obtained when 75 kg N·ha^{-1} was applied. Pramanik and Bera, 2013, found significant effect of seedling age and nitrogen fertilization on plant height of hybrid rice. They found maximum plant height (103.81 cm and 112.84 cm) when 10 days old seedlings were transplanted and nitrogen was applied at 200 kg·ha^{-1}, while minimum plant height (91.38 cm and 81.63 cm) was observed with the seedlings of 30 days age and with no nitrogen application.

Table 3. Plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield (tha^{-1}), 1000-grain weight (g), harvest index (%) and spikelet fertility (%) as affected by the interaction between seedling age and N rates during 2014 and 2015 seasons.

Hybrids	N-rates (kgN/ha)	Plant height (cm)		Panicles hill^{-1}		Panicle weight (g)		Panicle length (cm)		Grain yield tha^{-1}		1000-grain weight(g)		Harvest Index (%)		Spikelet fertility (%)	
		2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Egyptian Hybrid 1	0	94.57	95.77	12.19	13.93	3.40	3.53	18.21	19.90	5.500	6.405	23.98	24.20	32.80	34.50	91.60	93.6
	55	95.49	97.12	17.30	18.50	3.67	3.86	22.06	22.42	10.370	11.138	24.66	25.00	43.35	47.33	92.46	94.55
	110	102.84	105.37	23.24	24.40	4.10	4.73	22.71	23.36	10.920	11.576	25.64	26.20	44.30	50.23	94.51	96.52
	165	107.20	110.73	26.70	28.02	4.83	5.17	24.36	25.06	11.360	12.323	26.63	27.54	46.80	51.16	96.02	97.9
SK2151H	0	84.06	86.23	11.15	12.53	3.14	3.40	17.33	18.31	4.500	5.207	24.55	24.74	31.44	32.32	92.31	94.43
	55	93.29	95.07	18.38	18.53	3.30	3.55	21.53	21.86	9.090	9.896	25.60	25.86	42.40	46.80	93.69	96.01
	110	95.57	96.52	20.84	23.17	3.82	4.11	22.43	22.87	10.020	10.543	26.32	27.30	44.03	47.67	95.57	97.57
	165	103.46	106.82	24.35	25.65	4.03	4.43	23.57	23.94	10.720	11.236	27.17	28.17	45.56	48.36	96.04	98.07
LSD 0.05		0.7	0.8	0.02	0.03	0.02	7.6	0.02	0.02	0.03	0.03	0.02	2.5	0.02	7.6	0.1	6.7
LSD 0.01		0.9	1.15	0.03	0.04	0.03	0.01	0.02	0.03	0.04	0.04	0.04	3.7	0.03	0.01	0.17	9.7

* and **significant differences at 0.05 and 0.01 level of probability respectively.

Table 4. Plant height (cm), panicles hill^{-1}, panicle weight (g), panicle length (cm), grain yield tha^{-1}, 1000-grain weight (g), harvest index (%) and spikelet fertility (%) as affected by the interaction between seedling age and N rates during 2014 and 2015 seasons.

Seedling ages (day)	N-rates (kgN/ha)	Plant height (cm)		Panicles hill $^{-1}$		Panicle weight(g)		Panicle length (cm)		Grain yield (tha^{-1})		1000-grain weight(g)		Harvest Index (%)		Spikelet fertility (%)	
		2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
20	0	90.30	91.41	12.65	14.50	3.50	3.70	18.55	20.40	6.138	6.898	24.51	24.79	33.63	35.55	92.86	94.85
	55	95.26	97.38	20.02	21.10	3.75	3.90	22.20	22.80	10.565	11.239	25.52	25.95	43.98	47.36	94.02	96.03
	110	101.10	103.50	23.65	25.51	4.35	4.85	23.07	23.72	11.391	11.735	26.50	27.40	46.10	49.15	96.03	98.04
	165	107.13	110.06	27.63	29.00	4.85	5.50	24.60	26.35	12.013	12.700	27.85	28.7	48.40	53.75	97.13	99.1
25	0	89.21	91.56	11.56	13.20	3.26	3.45	17.77	19.01	4.871	5.963	24.40	24.6	31.86	32.04	92.06	94.01
	55	94.43	96.23	17.80	18.53	3.48	3.66	21.85	22.19	9.851	10.540	25.30	25.42	43.08	47.05	93.34	95.45
	110	98.58	100.79	22..45	23.90	3.98	4.40	22.75	23.25	10.505	11.125	26.18	26.75	44.30	48.0	95.30	97.3
	165	105.68	109.23	25.65	26.96	4.50	4.70	23.90	24.55	11.090	11.605	26.85	27.80	46.10	50.02	96.45	98.45
30	0	88.43	90.33	10.80	12.00	3.05	3.25	17.00	17.92	4.008	4.558	23.91	24.01	30.88	30.1	90.93	93.2
	55	93.39	94.67	15.70	16.60	3.23	3.40	21.25	21.45	8.786	9.720	24.58	24.85	41.60	45.8	91.86	94.35
	110	97.95	98.56	20.01	21.95	3.55	4.02	21.90	22.35	9.518	10.320	25.23	26.10	42.10	46.06	93.81	95.8
	165	103.18	107.01	23.30	24.47	3.95	4.19	23.40	23.60	10.038	11.00	26.01	27.05	44.05	48.1	94.51	96.51
LSD 0.05		0.8	0.9	0.03	0.03	0.03	9.3	0.02	0.03	0.03	0.03	0.03	3.09	0.03	9.29	0.03	8.19
LSD 0.01		1.2	1.4	0.04	0.04	0.04	0.01	0.03	0.04	0.04	0.04	0.04	4.5	0.03	0.01	0.04	0.01

* and **significant differences at 0.05 and 0.01 level of probability respectively.

Table 5. Plant height (cm), panicles hill $^{-1}$, panicle weight (gm), panicle length (cm), grain yield tha^{-1}, 1000-grain weight (g), harvest index (%) and spikelet fertility (%) as affected by the interaction among hybrid combination, seedling ages, and N-rates in 2014 and 2015 seasons.

Hybrids	Seedlig ages (day)	N-rates (kgN/ha)	Plant height (cm)		Panicles hill^{-1}		Panicle weight (g)		Panicle length (cm)		Grain yield (tha^{-1})		1000-grain weight (g)		Harvest Index (%)		Spikelet fertility (%)	
			2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Egyptian Hybrid 1	20	0	95.50	97.50	13.06	15.00	3.61	3.80	19.10	21.	6.900	7.316	24.01	24.39	34.16	36.50	92.02	94.02
		55	96.40	98.76	19.77	21.30	3.90	4.01	22.30	23.10	11.280	12.036	25.00	25.50	44.80	47.80	93.40	95.05
		110	105.02	108.01	24.30	26.01	4.50	5.10	23.15	24.05	11.870	12.420	26.01	26.80	46.40	49.4	95.05	97.08
		165	109.03	112.31	28.80	30.13	5.20	5.90	24.90	26.03	12.620	13.600	27.40	28.01	49.20	51.2	97.17	99.01
	25	0	94.43	95.63	12.01	13.80	3.40	3.50	18.05	20	5.510	6.800	24.00	24.20	32.6	32.6	92.10	94.01
		55	95.90	96.90	16.90	18.01	3.66	3.77	22.10	22.38	10.470	11.070	24.70	25.01	43.67	45.7	92.65	94.9
		110	103.06	106.0	23.40	24.30	4.10	4.70	22.80	23.50	10.960	11.500	25.80	26.10	44.40	48.4	94.90	96.9
		165	108.20	111.01	26.70	28.13	5.00	5.01	24.30	25.10	11.410	12.200	26.50	27.60	46.60	50.6	96.90	98.8
	30	0	93.80	94.8	11.50	13.01	3.20	3.30	17.50	18.70	4.110	5.100	23.95	24.01	31.66	29.7	90.66	92.8
		55	94.19	95.7	15.23	16.200	3.46	3.50	21.60	21.79	9.370	10.310	24.30	24.50	41.60	44.6	91.70	93.7
		110	100.40	102.1	22.01	22.90	3.70	4.40	22.20	22.50	9.930	10.800	25.11	25.70	42.10	46.1	93.60	95.6
		165	104.36	109.0	24.60	25.80	4.30	4.60	23.90	24.10	10. 60	11.170	26.01	27.01	44.50	49.6	94.01	96.01
SK215H	20	0	85.11	87.01	12.25	14.00	3.40	3.60	18.01	19.80	5.380	6.480	25.01	25.20	33.10	34.1	93.70	95.7
		55	94.13	96.01	20.28	20.90	3.60	3.80	22.10	22.50	9.850	10.550	26.04	26.40	43.17	46.7	95.01	97.02
		110	97.13	99.1	23.01	25.00	4.20	4.60	23	23.40	10.910	11.050	27.00	28.0	45.80	48.8	97	99.01
		165	105.23	108.01	26.46	28.0	4.50	5.10	24.30	24.70	11.420	11.800	28.30	29.40	47.60	50.6	97.10	99.2
	25	0	84.00	85.8	11.11	12.60	3.12	3.40	17.60	18.01	4.230	5.126	24.80	25.0	31.12	32.1	92.3	94.02
		55	92.96	95.5	18.70	19.05	3.30	3.55	21.60	21.99	9.230	10.010	25.90	26.05	42.50	45.5	94.20	96.01
		110	94.10	95.2	21.50	23.30	3.86	4.10	22.70	23.11	10.050	10.750	26.56	27.40	44.20	47.2	95.7	97.7
		165	103.16	107.46	24.60	25.40	4.01	4.40	23.50	24.00	10.770	11.00	27.20	28.01	45.60	48.6	96	98.01
	30	0	83.06	85.86	10.10	11.0	2.90	3.20	16.50	17.14	3.900	4.020	23.86	24.0	30.10	38.1	91.20	93.6
		55	92.60	93.63	16.18	17.0	3.01	3.30	20.90	21.11	8.200	9.136	24.80	25.20	41.60	44.6	92.3	95.01
		110	95.50	95.0	18.01	21.01	3.40	3.64	21.68	22.20	9.100	9.836	25.40	26.50	42.10	46.1	94.2	96.02
		165	102.00	105.0	22.01	22.15	3.60	3.79	22.91	23.11	10.010	10.300	26.01	27.10	43.50	47.5	95	97.02
LSD 0.05			1.2	1.4	0.04	0.04	0.04	0.01	0.03	0.04	0.04	0.03	0.03	4.4	0.04	0.01	0.02	0.01
LSD 0.01			1.7	1.1	0.06	0.06	0.06	0.02	0.04	0.05	0.06	0.06	0.06	6.3	0.05	0.02	0.31	0.02

* and **significant differences at 0.05 and 0.01 level of probability respectively.

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تأثير التسميد النتروجينى وعمر البادرة على انتاجية بعض هجن الآرز المبشرة

حسن شحاته حمد

قسم بحوث الأرز – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – الجيزه – مصر.

أجريت هذه الدراسة في مزرعة مركز البحوث الزراعية – محطة بحوث سخا – كفر الشيخ – مصر. خلال موسمي الزراعة 2014 ،2015 وكانت التجربة تهدف إلى دراسة تأثير أعمارألشتل لآثنين من التراكيب الارز الهجينيه وهوهجين مصرى 1 و هجين 2151 علي صفات المحصول ومكوناته وكان التصميم المستخدم هو قطع منشقه مرتين في ثلاث مكررات حيث تم وضع الهجين في القطع الرئيسية و أعمار الشتل في المنشقة وهى (20–25–30 يوم) و مستويات النيتروجين وهي (0–55 –110– 165 كجم / للهكتار) في القطع تحت الشقيه وقد تم تسجيل البيانات على صفات أرتفاع النبات وعدد السنابل ووزن السنبلة وطول السنبلة ومحصول الحبوب ودليل الحصاد ومعدل الامتلاء وكانت اعلي القيم في كل الصفات مع عمر الشتل 20يوم ومستوى نتروجيني 165كجم / للهكتار للهجين سخا 2034 فى كلا الموسمين. و محصول الحبوب كان600 و13طن/للهكتار بأستخدام 165كجم نتروجين / للهكتار مع عمر الشتل 20يوم للهجين مصرى1 فى كلا الموسمين.