Effect of seedling age on yield and yield component of rice cultivars (*Oryza sativa* L.)

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ABSTRACT

For studying study of seedling age on the yield and yield component of rice cultivars. The experimental was applies in education and research farm of Islamic Azad University in Chalous on 2012 of Iran. The primary factor of seedling age (20, 27, 35 days) and the secondary factor of rice cultivar (Tarem Deylamani, Danesh, Nok Siah) were considered. The greatest seed's yield had been related to the 27 days seedling age among the seedling ages with 5.82 ton per hectare. Among the cultivars of the maximum and minimum yield of the seed was produced in Tarem Deylamani cultivar with 6.47 ton per hectare and Fajr cultivar as well with 4.87 ton per hectare. The greatest yield of the seed was produced under the counter effect of 2 factors for Tarem Deylamani cultivar. The weight of a thousand seed influenced by the cultivar and the counter of seedling age on the cultivar became probably 1%. The maximum weight of a thousand seed influenced by the seedling age was produced for the 27 day age (22.08 gr) and the least was for the 20 day age (20.23). The maximum weight of a thousand seed was produced in the 27 day of seedling age and Tarem cultivar (27 gr) due to the counter effect of seedling age.

Keywords: rice, seedling age, cultivars, seed yield

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INTRODUCTION

Seedling age is considered as one of the main agricultural factor for the uniform positioning of rice bushes [1]. The condition and the length of cycle of growing seedling can affect the recycling of seedling in the main field and the agricultural characteristics and the yield of the rice as well [2]. Transferring seedling in proper age can provide appropriate ground for achieving potential production by reducing the death of bushes and shortening the period of recycling of seedlings [2]. The seedling age at the time of transferring is different and depends on the condition of plant growth which is itself influenced by the density of the seed, the cultivar of rice and weather condition especially the temperature in to Spring. In most Asian areas, the seedling age at the time of transferring to main field is about 25 to 30 days [3]. In case the seedling age goes beyond 35 days, it will reduce the yield [4]. Because the bush starts hitting the stalk that least to increase of damages to the root while extracting the seedling [5]. If the seedlings aren't transferred to main field in the specific time, the yield will reduce. And if the seedling, are transferred to the main field sooner than the specific time, taking care of them will happen when the weather is cool and in this case, the percent of their protein will reduce and will grow later. And if the seedling is transferred to the main field later than the specific time, the period of taking care of them will be along with raining that this matter will cause serious damage on the yield and the harassing will face difficulty. In northern areas of our country, the seedlings are transferred to main field after being produced in an ordinary pot depending on weather condition and the cultivars in 25-30 ages [6]. Therefore, this purposeful project have been implemented for the effect of seedling age on the yield and the details of yield on morphological qualities and the impact of this factor on the yield and the details agricultural yield of rice in the cultivars of Terem Deylamani, Danesh, Hajr and Nok Siah and regarding the

area, it can be an important fact or for understanding their distinct qualities that will make valuable contribution to their more production.

MATERIALS AND METHODS

The stages of conducting experiment

In order to preparing the cot for sowing the seeds, first the field of the pot is watered and then plowing was conducted by tiller in the depth of 15-20 centimeter. After conducting the second plow and leveling the packages atmospherically, a mound was prepared. For fighting against weeds especially Soorof, the pot was deeply irrigated after leveling and preparing the ground and the herbicide "bota" Cholna Machti was sprinkled on it and the experiment seeds were disinfected through the Fungus killer "Tufanat Metil Tesivum". And after preparing the pot, the urea fertilizer was sprinkled on the pot by hand as starter. In this experiment, the seeds were soaked for 72 hours and were put in cloth so that sprouting will happen. Then, the sprouting seeds were spread on the pot by hand. After sowing the seeds, the pot was covered with a plastic to prevent damaging in cold weather of the early season and bird's fighting and maintaining the necessary heat. The nylon should be remained on the pot until the seedlings would have 2 or 3 leaves. The plastics on the 2 sides of pot were opened during warm hours of the day to make air flow and to prevent burning the seedlings.

Table (1) the analysis of fertilizing the soil of experimental farm

Date of taking sample soil	Depth of soil	Electrical guidance	Ph soil acidity	Percent of neutralized material	Organic carbon	Total soil	Absorbable phosphorus	Absorbable potassium
90.2.12	0-30cm	%63	6.61	%3.21	1.57	%12	24.3ppm	ppm130

Table (2) physical characteristic of the soil

Depth of sampling soil	Sand	Clay	Silt	Cultivar of tissue
0-30	5.7	59.76	39.88	Silt clay

The sampling was done from the soil of the main field for experimenting then, the first plow was done in winter and the second plow was in spring (May 2012) and in 15 day, before sowing the seeds and the third plow. The leveling of patches was done about 3 days before sowing and determining border happened as well. The herbicide "bota cholor" or "Maehh" was also used here. The required amount of fertilizer for each of patches was used according to fertilize ring recommendation of pedology laboratory in away that nitrogen fertilizer was used from urea source for amount of 200 Kg, k and 150 kg.h from sulphate potas that in this experiment, half of this amount was used. The amount 50% urea and %50 potas were spread on the field as the basic fertilizer after leveling the ground and before sowing the seeds. The amount of %25 urea and %25 potas was added to the soil along with the first weeding and the rest of that was added during forming of the first sprout of cluster in a pod. The first seedlings that previously were prepared in the pot were transferred at the main field in 20 days age. The intended poisons for some pests such as earthworm were used equally in all seedling ages and cultivars. The second series of transferring seedlings was occurred at the age of 27days and the third series of transferring the seedlings happened at the age of 35 days that the rest urea fertilizer and potas were also added to the ground. It should be noticed that the ages and different cultivars should be written an wooden table an and transferred to the main field before transferring the seedlings according to the plan and designing the intended experiment. The irrigation through brook is done that in this case water enters from one side and out the other side. After gathering information, the acquired data was analyzed by using MSTATC soft ware and the means were compared according to multiranged seeds in probability level of 5percent and Excel soft ware was used for drawing diagram.

RESULTS AND DISCUSSION

The Results obtaining from variance showed that, this quality was placed in the probability level of %7 due to seedling age effect, the cultivar and counter effect of the seedling age (Table 3)**.** The maximum length of cluster was achieved in seedling age of 27 days (22.95 cm) and its minimum length was produced in the seedling age of 35 days (27.04 cm) The maximum length of cluster affected by the cultivar was for Tarem Deylaman:(23.35 cm) and its minimum amount was produced for Fajr cultivar (20.8 cm). The counter effect of seedling age on the cultivar showed that the maximum length of the cluster was in the seedling age of 27days for Tarem Deylamani cultivar (25.65 cm) and its minimum amount was observed in the seedling age of 35 days for Fajr cultivar (18.77 cm) (Table 5)**.** Grist (2002) in examining 4 level of seedling age (60,45,30 and 70 days)reported that the length of the cluster will reduce by increasing the seedling age so that the maximum length of cluster was produced in the seedling age of 30 days, and its minimum amount was in the seedling age of 75 days [7].

The number of clusters in clusters

In principle, the number of clusters in clusters is a good index for increasing the yield. The obtained results of variance showed that this quality affected by the seedling age has not shown any significant difference and has been placed in the probability level of %7 due to the effect of the cultivar and the counter effect of the seedling age in the cultivar. The maximum number of clusters in clusters was obtained in the seedling age of 27 days (774.6 clusters in clusters) and its minimum amount was produced in the seedling age of 20 days (706.4 clusters) and the maximum number of clusters in clusters affected by the cultivar was obtained for Danesh cultivar (779.6 clusters in clusters) and its minimum number was produced in Fajr cultivar (94.68 clusters in clusters) (Table 4). The counter effect of the seedling age on the cultivar showed that the minimum number of clusters in clusters was produced in the seedling age of 35 days for Fajr cultivar and the maximum amount was in the seedling age of 27 days for Tarem Deylamani cultivar (134.7 clusters) (table 5).

The amount of full clusters

In principle, the amount of full clusters can be considered a very good index in increasing the yield. The amount of full clusters is also an indicator of a better allocation of photosynthesis materials to clusters from the whole biological materials. The amount of clusters is a good criterion for the existence of a reservoir for receiving photosynthesis materials. The obtained results of variance showed that this quality affected by the seedling age was placed in the probability level of %5 and was in the probability level of %1 due to the effect of the cultivar. And, this quality did not show any significant difference due to the counter effect of the seedling age on the cultivar (Table 3).

The amount of full clusters affected by the seedling age was produced in the seedling age of 27 days (72.06 full clusters) and its minimum amount was obtained in the seedling age of 20 days (100.6 full clusters). And the maximum amount of full clusters affected by the cultivar was for the Tarem Deylamani cultivar (778.8 full clusters) and its minimum amount was produced in Fajr cultivar (89.82 full clusters) (table 4). The counter effect of the seedling age on the cultivar showed that the maximum amount of full clusters was produced in the seedling age of 27days for Tarem Deylamani cultivar (732.7 full clusters) and its minimum amount was obtained in the seedling ages of 35 days for Fajr cultivar (87,88.70 full clusters) (table 5). Abolhasani (2009) stated that the amount of full clusters will increase by increasing the seedling age from 25 to 35 days. Alem and the colleagues reported that the amount of full clusters was increased by growing the seedling age from 27 to 35 days [8].

Total weight

The obtained results of variance analysis showed that this quality affected by the seedling age didn't show significant difference and was placed in the probability level of %5 due to the effect of the cultivar and counter effect of the seedling age on the cultivar (table 3). The maximum of total weight affected by the seedling age was obtained in the seedling age of 27 days (1573 gr) and its minimum amount was in the seedling age of 20 days (7398 gr). And the maximum of total weight affected by the cultivar was for Tarem Deylamani cultivar (1647) and the minimum of the total weight was obtained for Fajr cultivar (1332 gram) (table 4). The counter effect of the seedling age on the cultivar showed that the maximum of the total weight was obtained in the seedling age of 27 days for Tarem Deylamani cultivar and its minimum weight was in the seedling age of 35 days for Fajr cultivar (7242 gr) (table 5).

1000 seed -weight

The 1000 seed -weight Daneh is one the most important details of the yield which is the indicator of more allocation of photosynthesis material to the seeds. The obtained results of the variance analysis showed that this quality affected by the seedling age has been in the probability level of %5 and has placed in the probability level of %7 due to the effect of the cultivar and counter effect of the seedling age. The maximum of 1000 seed -weight was obtained in the seedling age of 27 days (22.08) and its minimum amount was in the seedling age of 20 days (20.3 gr) due to the seedling age effect. And the maximum 1000 seed -weight affected by the cultivar was obtained for Tarem Deylamani cultivar (23 gr) and its minimum amount were for Fajr cultivar (19 gr) (table 4). The counter effect of the seedling age on the cultivar showed that the maximum weight of Hezar daneh was gained in the seedling age of 27 days for Tarem Deylamani cultivar(27 gr) and its minimum amount was obtained in the seedling age of 35 days for Fajr cultivar. (77.33 gr) (Table 5). Moyen and the colleagues (2610)reported in the experiments on the 3 seedling age (37,27,47 days) in 2 years that the seedling age has not had any significant effect on the 1000 seed-weight. Alem and the colleagues announced that the 1000 seed -weight was not affected by any of the seedling ages statistically. Kalita and the colleagues declared that the 1000 seed -weight in the rice is one of the most stable qualities of the cultivar and is higher than the other details of yield due to genetic Stability.

Seed yield

The table of variance analysis showed that this quality has been in the probability level of %5 due to seedling age

effect and has been in the %7 probability because of the cultivar impact and counter effect of the seedling age on the cultivar (Table 3)**.** The maximum yield of the seed affected by the seedling age was for the seedling ages of 27 and 20 days (5.820, 5734 ton per hectare) respectively and the minimum yield of the seed was produced in the seedling age of 35 days (5.381 ton per hectare) .The maximum yield of the seed affected by the cultivar was produced for Tarem Deylamani cultivar (6.470 ton per hectare) and its minimum amount was for Fajr cultivar (4.87 ton per hectare) (Table 4). Due to the counter effect of the seedling age on the cultivar, the maximum yield of the seed was produced in the seedling age of 27days for Tarem Deylamani cultivar and its minimum amount was obtained in the seedling age of 35 days for Fajr cultivar (4.46 ton per hectare) (Table 5). Abolhasani (2009) stated that however the seedling age did not have any significant effect on the yield of the seed but the amount of seeds yield in the seedling age of 25 days was more than of 35 ones[8]. Gilani et al (2001) reported that the yield of the seed was significant among the seedling ages. And the seedling of 25 days with mean seeds of 6.4 ton per hectare had 12 and 16 higher percentage than 35 and 45 days seedlings [9].

Table (3) the analysis and variance of agronomy traits in experimented areas

S.O.V	Number of full clusters	Total weight (gr)	Weight of 1000 seeds (gr)	Total clusters in cluster	Length of cluster (m)	Yield of seeds (ton.ha)
Block	3.514n.s	19614.33n.s	0.194n.s	7.927n.s	0.870n.s	149750.694n.s
A factor	386.429*	107225.58n.s	9.528*	204.672n.s	12.432**	648837.194*
Ea	47.84	18519.411	0.903	34.594	0.482	70794.44
B factor	1280.510*	159097.630**	n.s24.444	1157.987**	16.261**	4258727.064**
Counter effect of AB	63.032n.s	43764.046**	14.639**	263.337**	2.523**	444080.787**
Mistake(EB)	59.281	12.463	2.407	44.3.4	..55	90081.113
Cv%	7.40	7.73	7.35	6.04	3.40	5.32

*in probability of %5 **in probability level of %1 and ns, shows it, meaninglessness.

Table (4) the comparison of the mean of simple effects of experimented qualities

Treatment	Number of full clusters	Total weight	Weight of 1000 seeds (gr)	number of clusters in clusters	Length of cluster	Seed Yield
a1 30days	100.6b	1398b	20.33b	106.4b	121.39b	5.734a
a2 27days	110.6a	1573a	22.08a	114.6a	22.95a	5.826a
a3 35days	101.0b	1424b	20.92b	109.3b	21.04b	5.381b
Tarem Deylamani b1	118.8a	1647a	23a	111.6a	23.35a	6.473a
Danesh b2	105.5b	1419bc	21b	119.66	21.76b	5.881b
Nok Siah b3	102.1b	1462b	44.21a	108.6b	21.99b	5.349c
Fajr b4	89.8c	1332c	19.00c	94.68c	20.8c	89.8d

*, **: showingthesignificantdifferenceinlevels1% and5%. Ns: showing the non-significant difference.

Table (5) the comparison of the mean of counter effect of planning age on the cultivar

Treatment	Number of full cluster	Total weight	The weight of 1000 seed (gr)	Number of cluster in cluster	Length of cluster	Yield of seed (ton.ha)
a1b1	111.3bc	147bcd	20.67cdef	111.3de	22.67b	6.460b
a1b2	105.1cd	1389de	20.33def	114.5cd	21.12d	5.137de
a1b3	97.23ef	1274de	21cde	103.3fg	21.92c	5.470ef
a1b4	88.70g	1360e	19.33f	96.60h	19.85e	5.270fg
a2b1	132.7a	1936a	27a	134.7a	25.65a	7.993a
a2b2	101.9bcd	1499bc	19.67ef	111.9c	22.22bc	1.190c
a2b3	108.1bcd	1463bcde	21.33cd	107ef	22.23cd	5.997gh
a2b4	93.77fg	1395cde	20.33def	98.82gh	21.63cd	4.900h
a3b1	112.5b	1536b	27.33cd	106.7ef	21.74cd	5.867b
a3b2	103.6de	1368de	23ba	126.4b	21.95c	5.71de
a3b3	100.9de	1549b	22bc	115.6cd	27.73cd	5.48ef
a3b4	87g	124.2f	12.33g	88.621	18.22f	4.4601

*, **: showingthesignificantdifferenceinlevels1% and5%. Ns: showing the non-significant difference.

CONCLUSION

The maximum yield of the seed was obtained in the seedling age of 27 days. Because the maximum amount of total clusters in clusters, full clusters fertile the stalk heighted bushes , total weight and 1000 seed -weight was gained in this Seedling age. Tarem Deylamani cultivar had the most yields because of increasing amount of fertilized stalks and weight of 1000 seed -weight and the maximum amount of clusters in clusters and full clusters. The minimum amount of seed was produced for Fajr cultivar because the weight of 1000 seed -weight, the amount of clusters in clusters, length of the cluster and the amount of full clusters were minimum.

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