Asian Plant Research Journal

6(4): 67-74, 2020; Article no.APRJ.62652
ISSN: 2581-9992

Effect of Sowing Times on Yield Attributes of an Exotic (China) Hybrid Rice Variety in Bangladesh

Setara Begum[1*], Md. Hafizur Rahman[2], Md. Mamunur Rashid[3], Md. Sirajul Islam[3], Md. Rezaul Manir[3] and A. K. M. Salahuddin[3]

[1]Bangladesh Rice Research Institute, Bangladesh.
[2]Sher-e-Bangla Agricultural University, Bangladesh.
[3]Bangladesh Rice Research Institute (BRRI), Bangladesh.

Authors' contributions

This work was carried out in collaboration among all authors. Author SB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MHR, MMR and AKMS managed the analyses of the study. Authors MSI and MRM managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/APRJ/2020/v6i430138
Editor(s):
(1) Dr. Langa Tembo, University of Zambia, Zambia.
Reviewers:
(1) Argha Ghosh, Bidhan Chandra Krishi Viswavidyalaya, India.
(2) Barlin Orlando Olivares Campos, University of Cordoba, Spain.
Complete Peer review History: http://www.sdiarticle4.com/review-history/62652

Original Research Article

Received 02 September 2020
Accepted 09 November 2020
Published 07 December 2020

ABSTRACT

This experiment was conducted at the Agricultural Botany experimental field of Sher-e-Bangla Agricultural University (SAU), Sher-e-Bangla Nagar, Dhaka during the period from January to April 2014 to study the effect of sowing times on the yield attributes of an exotic (China) hybrid rice variety in Bangladesh. Five treatments were considered regarding 5 sowing dates or transplanting dates viz. (i) S_1 = 1st sowing at 1st January 2014; transplanted at 21st January, (ii) S_2 = 2nd sowing at 21st January; transplanted at 11th February, (iii) S_3 =3rd sowing at 11th February; transplanted at 3rd March, (iv) S_4 = 4th sowing at 3rd March; transplanted at 23rd March and (v) S_5 = 5th sowing at 23rd March; transplanted at 13th April. Data were recorded on different growth parameters to examine the effect of sowing times on the yield attributes of the tested variety. The studied parameters were significantly affected by different sowing times or transplanting times. Results revealed that different parameters regarding yield attributes, the seeds of the test variety sown at 1st January 2014 and transplanted at 21st January (S_1) furnished the best results in respect of the weight of filled grain hill^{-1}

**Corresponding author: E-mail: setu.edu.bd@gmail.com;*

(38.87 g), weight of filled grain plot^{-1} (2.18 kg), 1000 seed weight (36.00 g), grain yield ha^{-1} (3.64 ton) and the highest harvest index (43.46%) compared to the seedling transplanted on other dates or times. These findings can be used in further breeding program.

Keywords: Sowing dates; yield attributes; hybrid rice variety.

1. INTRODUCTION

Rice (*Oryza sativa*) belongs to the family Gramineae. In Asian countries, rice is a staple food for at least 62.8% of total planet inhabitants and it contributes on an average 20% of apparent calorie intake of the world population and 30% of the population. This calorie contribution varies from 29.5% for China to 72.0% for Bangladesh [1]. Around the world, it is the most important food crop and the foremost food for approximately more than two billion people in Asia [2]. All rice is grown 90% and consumed in Asia [3, 4]. An alarming rate for Bangladesh is population increasing and reducing the cultivable land is due to urbanization and shortage of food due to industrialization. Every year about 2.3 million people to its total of 150 million people were added in the nation [5]. In Bangladesh, population growth demands continuously increase in rice production. So, the highest priority has been given to more rice production [6]. At least 60% increase production of rice has to be to meet up food requirement of the increasing population by the year 2020 [7]. So, scientists were concerned about various rice production technologies to augment the rice production. Hybrid rice technology is one of the most effective demands for mitigating tactics. Hybrid rice technology development in Bangladesh began in 1993. Hybrid rice yields about 15-20% more than the promising high yielding commercial varieties. The Government encouraged private sector companies to import hybrid rice seeds and try them with farmers. Some private seed companies imported rice hybrids and evaluated them through on-farm trials during 1997-98 in Boro season (winter rice) [8]. The Chinese hybrid rice has demonstrated that the yield capability of hybrid rice must be accomplished, on the off chance that each ecological zone builds up its own particular variety or screens variety created in different areas to meet particular nearby conditions [9]. Planting time affects not only growth and productivity of rice but also generally, affects on seed quality. Planting time affects seed quality through affecting seed growth and development as it obtained different environmental conditions in the processes of seed development and seed maturation [10]. Although variation in climatic parameters make it hard to choose ideal planting times for hybrid rice, however, endeavor is needed to discover the most fitting time of cultivating hybrid rice keeping in mind the end goal to maintain a strategic distance from the hazard in hybrid rice production. In Bangladesh Boro rice has been gaining much importance. The average per hectare yield of Boro rice is higher than that of Aus and Aman rice [11]. Among the three rice seasons of Bangladesh, it is the longest rice season, producing the highest grain yield [12]. More vital advantage of Boro season is the lower winter temperature amid the prior crop growth. This encourages the assimilation of photosynthates, subsequently expanding carbon: nitrogen proportion. Amid the maturing time, the temperature rises encouraging the procedure. Variations in these parameters clarify variation in yields over the Boro growing territories [13]. The variety used for this experiment is completely new in Bangladesh even if it has enough proficiency in china. Based on the above importance, this research work is designed to evaluate the growth and yield performance of an exotic (China) hybrid rice variety in different planting time with the following specific objectives.

1. To find of the out the response of this hybrid rice to different dates of planting in Boro season in Bangladesh.
2. To study the yield attributes of this hybrid rice variety.
3. To find out the appropriate planting time to have maximum yield.

2. METHODOLOGY

This experiment was conducted at the experimental field of Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during the period from January to August 2014 to study the effect of sowing times on the yield attributes of an exotic (China) hybrid rice variety in Bangladesh. Details of the materials and methods have been presented below:

2.1 Location

Experimental field of Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka. The location of the site is 23o74′N latitude and 88o35′ longitude with an elevation of 8.2 meter from sea level.

2.2 Climate

The geographical location of the experimental site was under the subtropical climate, characterized by three distinct seasons, winter season from November to February and the pre-monsoon period or hot season from March to April and monsoon period from May to October.

2.3 Weather

Details of meteorological data in respect of average temperature 19.10, 23.40, 31.60, 29.20 84(^{o}C), rainfall 3.00, 2.00, 3.00, 1.00 (mm), relative humidity 66.50, 61.00, 72.70, 68.50 (%) and sunshine hours 194.10, 221.50, 227.00, 194.10 during January, February, March and April 2014 respectively.

2.4 Plant Material

Chinese team of Yunan Pradesh were suddenly visited at Sher-e-Bangla Agricultural University, They gave one packet hybrid rice seed for experimental purpose.

2.5 Experimental Details

2.5.1 Treatments

Randomized Complete Block Design (RCBD) with four replications.

Single factors: Sowing times

S_1 = 1st sowing at 1st January 2014; transplanted at 21st January

S_2= 2nd sowing at 21st January; transplanted at 11th February

S_3= 3rd sowing at 11th February; transplanted at 3rd March

S_4= 4th sowing at 3rd March; transplanted at 23rd March

S_5= 5th sowing at 23rd March; transplanted at 13th April

2.6 Unit Plot Size

The size of each unit plot was 12 m^2 (4 m x 3 m). There were 20 plots in total.

2.7 Growing of Crop

Seed sprouting and preparation of seedbed, preparation of main field, fertilizer and manure application were done as per recommendations of Bangladesh Rice Research Institute(BRRI, 2013).

2.8 Intercultural Operation

Irrigation and drainage, weeding and gap filling, top dressing and other plant protection measures were taken as per necessity.

2.9 Data Recording

The yield attributes of this experiment are filled grains hill^{-1}, unfilled grains hill^{-1}, weight of filled grain plot^{-1}, weight of unfilled grains plot^{-1}, weight of 1000 seeds, grain yield, Stover yield, harvest index etc. The data were collected from randomly selected 10 plots and separated into filled grain and unfilled grain. This data recording procedure is in conformity with Safdar, et al. [14].

2.10 Statistical Analysis

The mean values of all the characters were calculated and analysis of variance was performed. The significance of the difference among the treatments means was estimated by the Duncan's Multiple Range Test (DMRT) at 5% level of probability [15].

3. RESULTS

The results of the study were presented by evaluating the yield performance of an exotic (China) hybrid rice variety by different dates of sowing of seeds maintaining the same interval of transplanting of seedlings. The experimental findings regarding yield attributes have been presented under the following headings:

3.1 Weight of Filled Grain Hill^{-1}

Weight of filled grain hill^{-1} (g) was significantly influenced by different transplanting dates (Fig. 1). Results showed that the highest weight of filled grain hill^{-1} (38.87 g) was achieved from S_1 (21 January 2014 transplanting) which was statistically similar to achieved from S_1 (21 January 2014 transplanting) which was statistically similar to achieved from S_1 (21

January 2014 transplanting) which was statistically similar to date of sowing S_4 (23 March 2014 transplanting). Xu *et al*., (2006) also observed that early showing is beneficial for the improvement of filled grain. It was reported that more number of showing is beneficial for the improvement of filled grain. It was reported that more number of successive seeding dates.

3.2 Weight of Unfilled grain Hill^{-1}

Transplanting dates had significant effect on weight of unfilled grain hill^{-1} (g) (Fig. 1). The finding revealed the highest weight of unfilled grain hill^{-1} (6.83 g) which was achieved from S_4 (23 March 2014 transplanting) followed by S_5 (13 April 2014 transplanting) where from S_4 (23 March 2014 transplanting) followed by S_5 (13 April 2014 transplanting) where 2014 transplanting) followed by S_2 (11 February 2014 transplanting). This high percentage of unfilled grains/panicle in these late sowing dates could be attributed by reduction of spikelet fertility or increase of spikelet sterility in this period. These results are similar to that obtained by Akram *et al.* (2007). Also similar to Prasad et al., (2001), Mohamed et al., (2012) and Osman et al. (2015).

3.3 Weight of Filled Grain Plot^{-1}

In the present study transplanting dates significantly affected by weight of filled grain plot^{-1} (kg) (Fig. 1). Results showed that the highest weight of filled grain plot^{-1} (2.18 kg) was achieved from S_1 (21 January 2014 transplanting) which was statistically similar to sowing date S_2 (11th February 2014 transplanting). While the lowest weight of filled grain plot^{-1} (00.00 g) was recorded 2014 transplanting). While the lowest weight of filled grain plot^{-1} (00.00 g) was recorded March 2014 transplanting). Among the yield attributes, tiller number per plant. 1000-seed March 2014 transplanting). Among the yield attributes, tiller number per plant. 1000-seed weight and grain number per ear had a positive and significant correlation with yield which was obtained by Pirdashty et al., (2000).

3.4 Weight of Unfilled Grain Plot^{-1}

There was significant variation in results for different transplanting dates on weight of unfilled grain plot^{-1} (kg) (Fig. 1). Results showed that the maximum weight of unfilled grain plot^{-1} (0.605 kg) was recorded from S_5 (13 April 2014 transplanting) which was same as the results of sowing date S_4 (23 March 2014 transplanting) where as the lowest weight of unfilled grain plot^{-1} (0.065 kg) was obtained from the sowing date S_1 (21 January 2014 transplanting) and S_2 (11 February 2014 transplanting). This result has the similarity with the results of Bashir et al., (2010).

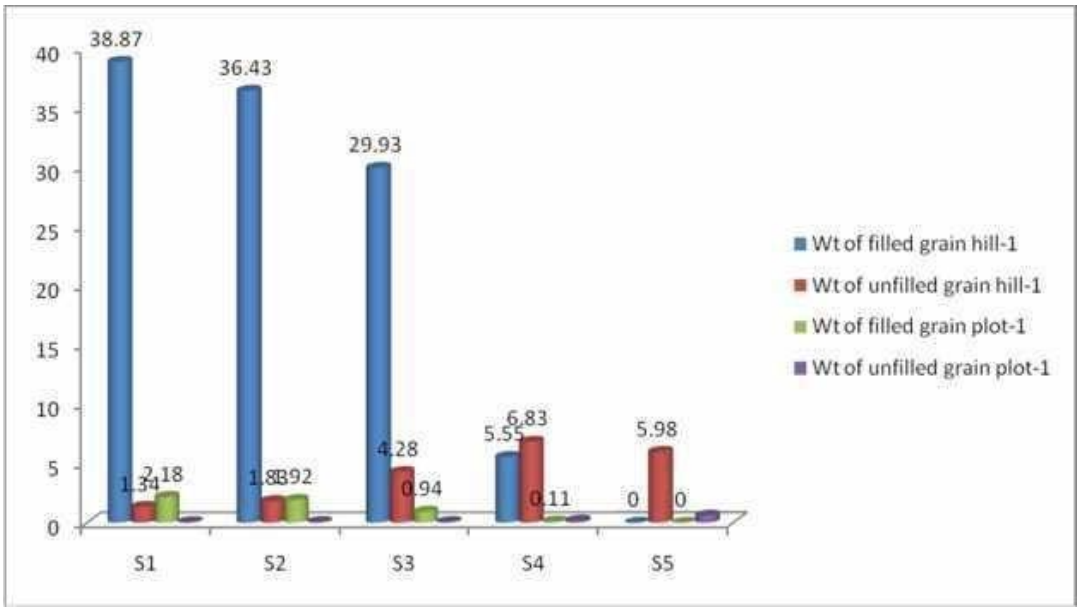

Fig.1. Effect of sowing times on yield contributing parameters regarding weight of filled grains hill^{-1}, weight of unfilled grains hill^{-1}, weight of filled grains plot^{-1}and weight of unfilled grains plot^{-1} of an exotic (China) hybrid rice variety

3.5 Weight of 1000 Seeds

Transplanting dates excreted significant effect on 1000 seed weight (g) (Fig. 2). The findings showed that the highest 1000 seed weight (36.00 g) was achieved from S_1 (21 January 2014 transplanting) followed by S_2 (11 February 2014 transplanting) and S_3 (3 March 2014 transplanting) where the lowest 1000 seed weight (g) (00.00 g) was recorded from S_5 (13 April 2014 transplanting) followed by S_4 (23 March 2014 transplanting). The result was found from Islam *et al*. (2008) have the conformity with the present study.

Islam et al. (2008) reported that different yield parameters like 1000 grain weight were significantly affected by transplanting time. This result was also supported by Surek et al. (1998), Salam *et al*. (2004) and Rahman (2003). Similar findings were obtained by Yawinder et al. (2006), Biswas and Salokhe (2001), Lu and Cai (2000) and Majid *et al.,* (1989). Early seeding (15 June) had the maximum 1000-grain weight and decreased as sowing time Shah and Bhurer, (2005) was delayed. 1000-grain weight was lowered gradually with late in planting time Mahmood et al., (1995).

3.6 Grain Yield ha^{-1}

There was highly significant variation among the results of different transplanting date treatments for grain yield ha^{-1} (ton) (Fig. 2). Results showed that the highest grain yield ha^{-1} (3.64 ton) was achieved from S_1 (21 January 2014 transplanting) followed by S_2 (11 February 2014 transplanting) on the other hand the lowest grain yield ha^{-1} (00.00 ton) was recorded from S_5 (13 April 2014 transplanting) followed by S_4 (23 March 2014 transplanting). The results from the present study were supported by Islam *et al*. (2008).

Islam et al. (2008) reported that rice planted on first December significantly reduced the grains per panicle and January planted rice significantly reduced the panicle per unit area. Different yield and yield parameters also significantly affected by transplanting time. This result was also supported by Surek et al. (1998), Salam *et al*. (2004) and Rahman(2003). These results are also in conformity with the findings of Shah and Bhurer(2005) who found out that seeding of 15 June recorded significantly the maximum grain yield and decreased with the late in sowing. The highest grain yields (4530, 4030 and 4530 kg ha^{-1}) were found in early sown rice group Khakwani et al. (2006). Rice grain yields declined as seeding date was delayed Hwang et al. (1998).

3.7 Stover Yield ha^{-1}

In the present study transplanting dates effectively affected stover yield ha^{-1} (ton) (Fig. 2). It was found that significant variation in results weight for stover yield ha^{-1} (ton) was seen among all the treatments. Results showed that the highest stover yield ha^{-1} (6.50 ton) was achieved from S_5 (13 April 2014 transplanting) followed by S_4 (23 March 2014 transplanting) where as the

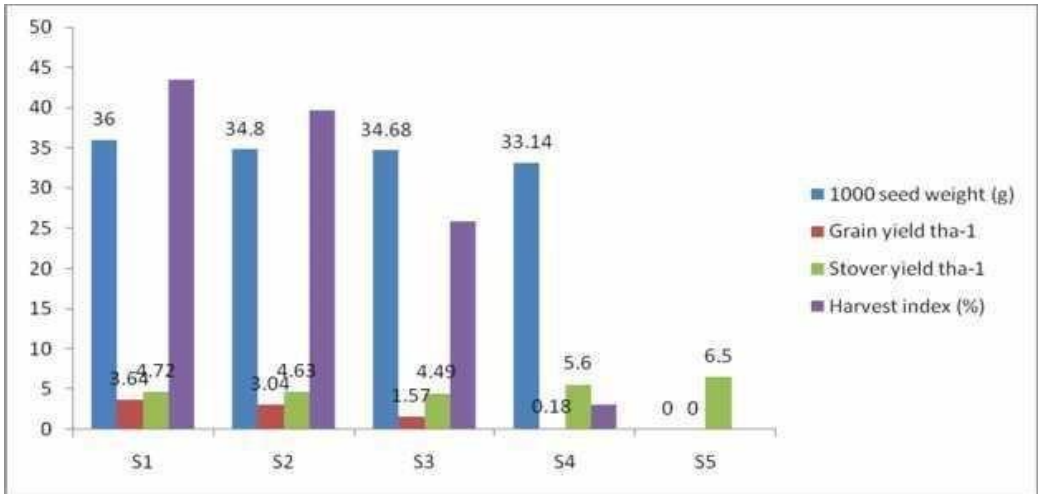

Fig. 2. Effect of sowing times on yield parameters regarding grain yield ha^{-1}, stover yield ha^{-1} and harvest index (%)

lowest stover yield ha^{-1} (4.49 ton) was recorded from S_3 (3 March 2014 transplanting) followed by S_2 (11 February 2014 transplanting).

3.8 Harvest Index

In the present study the results showed that delayed transplanting dates influenced in decreasing on the harvest index (%) (Fig. 2). Results revealed that the highest harvest index (43.46%) was achieved from S_1 (21 January 2014 transplanting) followed by S_2 (11 February 2014 transplanting) on the on the hand the lowest harvest index (%) (4.49 ton) was recorded from S_5 (13 April 2014 transplanting) followed by S_4 (23 March 2014 transplanting). Seeding rice before the predicted optimum periods would lengthen the time between seeding and emergence; increase production costs from the use of recommended seed treatments, higher seeding rates; a longer period for pest control and possibly result in poor stand establishment as reported by Osman et al., (2015) . Similar result was obtained by Safder et al.,(2013).

4. DISCUSSION

Result from the present study on different parameters as weight of filled grain hill^{-1}, weight of Result from the present study on different parameters as weight of filled grain hill^{-1}, weight of weight(g) , grain yield tha^{-1}, stover yield tha^{-1}, Harvest index (%) were significantly affected by different sowing date or transplanting date. Result revealed that weight of filled grain hill^{-1}, weight of filled grain plot^{-1},1000 grain weight and grain yield showed an increasing trend with early transplanting. There was significant variation in results for different transplanting dates on weight of unfilled grain plot^{-1} (kg) (Fig. 1). Results showed that the maximum weight of unfilled grain plot^{-1} (0.605 kg) was recorded from S_5 (13 April 2014 transplanting) which was same as the results of sowing date S_4 (23 March 2014 transplanting) where as the lowest weight of unfilled grain plot^{-1} (0.065 kg) was obtained from the sowing date S_1 (21 January 2014 transplanting) and S_2 (11 February 2014 transplanting). Results showed that the highest stover yield ha^{-1} (6.50 ton) was achieved from S_5 (13 April 2014 transplanting) followed by S_4 (23 March 2014 transplanting) where as the lowest stover yield ha^{-1} (4.49 ton) was recorded from S_3 (3 March 2014 transplanting) followed by S_2 (11 February 2014 transplanting).

In this sense, the duration of the phenological stages of rice is determined by genotype and environment within which, temperature and precipitation show greater influence and can delay or lengthen the life cycle of plants [16]. The temperature conditions of the experiment resulted in a longer duration of the vegetative and reproductive cycles, compared to that reported in the literature.

In some growth phases, there are other factors that can modify some effects of temperature. Minor modifying elements include drought [17, 18, 19], plant nutrition [20,21], and solar radiation [22]. The main modifiers are photoperiod (the total hours between the first and last light of each day) and vernalization. The biological cycle changes due to the genotype, climatic factors and their interaction [23]. The product of greatest interest in rice is the to understand the physiological factors that determine yield, one must discriminate between cultivars and agronomic management; For this, this type of agrometeorological study applied by phenological stage of cultivation is useful [24,25], which is important for making decisions based on phenological development and determining the optimal harvest time.

5. CONCLUSION

Result revealed that different sowing date have significant effects on the described exotic hybrid rice. The highest weight of filled grain hill^{-1}, weight of filled grain plot^{-1}, 1000 seed weight, grain yield ha^{-1} and the highest harvest index was achieved from S_1 (Transplanting on 21 January 2014) and the highest weight of unfilled grain plot^{-1} and the highest stover yield ha^{-1} was achieved from S_5 (Transplanting on 13 April 2014) but the highest weight of unfilled grain hill^{-1} was achieved from S_4(Transplanting on 23 March 2014). Another way, the lowest weight of filled grain hill^{-1}, filled grain plot^{-1}, 1000 seed weight (g), grain yield ha^{-1} and the lowest harvest index was recorded from S_5 (Transplanting on 13 April 2014) and the lowest weight of unfilled grain hill^{-1}and the lowest weight of unfilled grain plot^{-1} was recorded from S_1 (Transplanting on 21 January 2014) but the lowest stover yield ha^{-1} was recorded from S_3 (Transplanting on 3 March 2014). From the above findings it can be concluded that the results from different parameters regarding yield attributes, the treatment S_1 (Transplanting on 21 January 2014) gave the best results in respect of the weight of filled grain hill^{-1}, weight of filled grain plot^{-1}, 1000 seed weight, grain yield ha^{-1} and the highest harvest index compared to the seedling transplanted on other dates.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Calpe C, Prakash A. Sensitive and special products-A rice perspective. Commodity Market Review, FAO. 2007;49-71.
2. Hien NL, Yoshihashi T, Sarhadi WA. Evaluation of aroma in rice (*Oryza sativa* L.) using KOH method, molecular markers and measurement of 2-acetyl-1- pyrroline concentration. Japan. J. Trop. Agric. 2006; 50:190-198.
3. Anonymous. Production Year Book .Food and Agriculture Organization of the United Nations. 1997; 51.
4. Luh BS. Rice production. Second Edn. AVI Publication Company, Inc. USA. 1991;1.
5. Momin SI, Husain M. Technology development and dissemination to augment rice production in Bangladesh. In: 'The Guardian'. 2009;33-35.
6. Bhuiyan NI. The Hybrid Rice Program for Bangladesh. In: 'Hybrid Rice in Bangladesh: Progress and Future Strategies'. Bangladesh Rice Res. Inst. Publication No. 138. 2004;3-5.
7. Masum M. Impact of hybrid rice on Bangladesh. In: 'The Guardian". 2009; 56-58.
8. Castillo AG, Hampton JG, Coolbear P. Effect of sowing dates and harvest timing on seed vigor in garden pea (*Pisum sativum* L.). New Zealand J. Crop Hort. Sci. 1994;22:91-95.
9. BRRI (Bangladesh Rice Research Institute. Adhunik Dhaner Chash. Bangladesh Rice Res. Ins., Joydebpur, Gazipur, Bangladesh. 1999;5-9.
10. Gomosta AR, Quayyum HA, Mahbub AA. Tillering duration and yielding ability of rice varieties in the winter rice season of Bangladesh. Rice research tor iood security and poverty alleviation-Proceedings of the International Rice Research Conference; 2006.
11. Safdar ME, Noorka IR, Tanveer A, Tariq SA, Rauf S. Growth and yield of advanced breeding lines of medium grain rice as influenced by different transplanting date. J. Animal & Pla. Sci. 2013; 23(1):227-231.
12. Gomez KA, Gomez AA. Statistical procedure for agricultural research. International Rice Research Institute. John Wiley and Sons, New York. 1984; 139-240.
13. Abou-Khali AAB. Evaluation of some hybrid rice varieties in under different sowing time. African J. Pla. Sci. 2009;3(4): 53-58.
14. Khakwani AA, Zubair M, Mansoor M, Naveed K, Shah IH, Wahab A, Ilyas M, Ahmed I. Agronomic and morphological parameters of rice crop as affected by date of transplanting. J. Agron. 2006; 5(2):248-250.
15. Paraye PM, Kandalkar VS. Effect of seedling age on long-duration, rain fed varieties of rice under delayed trans-planting. Indian J. Agric. Sci. 1994;64(3): 187-188
16. Olivares B, Hernández R. Application of multivariate techniques in the agricultural land's aptitude in Carabobo, Venezuela. Tropical and Subtropical Agroecosystems, 2020; 23(2):1-12. Available:http://www.revista.ccba.uady.mx/ojs/index.php/TSA/arthttp://www.revista.ccba.uady.mx/ojs/index.php/TSA/article/view/3233/1457
17. Paredes-Trejo F, Olivares B. El desafío de la sequía en Venezuela. En: Núñez Cobo, J. y Verbist, K. (Eds.). Atlas de Sequía de América Latina y el Caribe. Francia, UNESCO. 2018; 127-136.
18. Olivares B, Hernández R. Ecoterritorial sectorization for the sustainable agricultural production of potato (*Solanum tuberosum* L.) in Carabobo, Venezuela. Agricultural Science and Technology. 2019;20(2):339-354. http://dx.doi.org/10.21930/rcta.vol20num2art:1462
19. Olivares B. (2018). Tropical conditions of seasonal rain in the dry-land agriculture of Carabobo, Venezuela. La Granja: Journal of Life Sciences, 27(1):86-102. Available:http://doi.org/10.17163/lgr.n27.2018.07
20. Olivares B, Hernández R, Arias A, Molina JC, Pereira Y. Zonificación agroclimática del cultivo de maíz para la sostenibilidad de la producción agrícola en Carabobo, Venezuela. Revista Universitaria de Geografía. 2018;27(2):139-159. Available:https://www.redalyc.org/articulo.oa?id=3832/383257592005
21. Olivares B, Hernández R, Arias A, Molina JC, Pereira Y. Identificación de zonas agroclimáticas potenciales para producción de cebolla (*Allium cepa* L.) en Carabobo,

Venezuela. Journal of the Selva Andina Biosphere. 2018;6(2):70-82.
Available:http://www.scielo.org.bo/pdf/jsab/v6n2/v6n2_a03.pdf

22. Hernández R, Pereira Y, Molina JC, Coelho R, Olivares B, Rodríguez K. Calendario de siembra para las zonas agrícolas del estado Carabobo en la República Bolivariana de Venezuela. Sevilla, Spain, Editorial Universidad Internacional de Andalucía. 2017;247.
Available:https://www.unia.es/explorar-catalogo/item/calendario-de-siembra-carabobo
23. Olivares B, Zingaretti ML, Demey Zambrano JA, Demey JR. Application of the STATIST-ACT method to the rain regime in the Venezuelan Oriental Region. UNED Research Journal. 2017;9(1):97-106.
Available:https://doi.org/10.22458/urj.v9i1.1684
24. Cortez A, Olivares B, Parra M, Lobo D, Rey JC, Rodriguez MF. Systematization of the calculation of the Standardized Precipitation Index as a methodology to generate meteorological drought information. Rev. Fac. Agron. (LUZ). 2019; 36(2):209-223.
Available:https://produccioncientificaluz.org/index.php/agronomia/article/view/31937
25. Olivares B, Zingaretti ML, Demey Zambrano JA, Demey JR. Tipificación de los sistemas de producción agrícola y la percepción de la variabilidad climática en Anzoátegui, Venezuela. Revista FAVE - Ciencias Agrarias. 2016;15(2):39-50.
Available:https://doi.org/10.14409/fa.v15i2.6587

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/62652