The Pharma Innovation Journal 2024; 13(3): 349-352

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
TPI 2024; 13(3): 349-352

www.thepharmajournal.com
Received: 14-01-2024
Accepted: 27-02-2024

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Effect of herbicide on rice plant height under direct seeded rice conditions

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Abstract
An experiment was conducted at the College farm, College of Agriculture, during Kharif, 2022-2023 in order to assess selected varieties for biomass phenotypical observations and seed production during kharif. The study aimed to analyse the growth of the rice in terms of plant height, leaf. Plant behavioural trait of diminishing growth towards the end of the growing season was noted in all the varieties. An overview of the leaf area measured indicated that in all Entry#1 and Entry #2 leaf area increased at an increasing rate up to harvest, at a diminishing rate from 60 to 90 DAS, and thereafter decreased towards maturity. The number of leaves in crops increased up to 60 DAS and thereafter decreased as the crop reached maturity.

Keywords: *kharif*, phenotypical observations, plant height

Introduction
Rice is a cereal grain, and in its domesticated form is the staple food for over half of the world's human population, particularly in Asia and Africa. Rice is the seed of the grass species *Oryza sativa* (Asian rice) or, much less commonly, *O. glaberrima* (African rice). Asian rice was domesticated in China some 13,500 to 8,200 years ago, while African rice was domesticated in Africa some 3,000 years ago. Rice has become common place in many cultures worldwide; in 2021, 787 million tons were produced, placing it fourth after sugarcane, maize, and wheat. Only some 8% of rice is traded internationally. China, India, and Indonesia are the largest consumers of rice. A substantial amount of the rice produced in developing nations is lost after harvest through factors such as poor transport and storage. Rice yields can be reduced by pests including insects, rodents, and birds, as well as by weeds, and by diseases such as rice blast. Traditional polycultures such as rice-duck farming, and modern integrated pest management seek to control damage from pests in a sustainable way.
Rice is commonly cultivated in Asia by transplanting one-month-old seedlings into puddles of constantly saturated soil. Because frequent puddling damages soil aggregates, lowers permeability in subsurface layers, and generates hard-pans at shallow depths, the succeeding non-rice upland crop in the cycle may suffer. Excess conveying of water for puddling during the warmest months of summer causes a drop in the water table and bad quality water for agriculture in the North West Indo-Gangetic Plain (IGP). While in the eastern IGP, rice transplanting is mainly reliant on monsoon rainfall and is one to three weeks postponed due to the conventional practice of puddling with ponded water (Rao *et al*., 2007). Farmers are therefore altering either their rice cultivation techniques (transplant to directly sowing in puddle soil) [Wet-DSR]) or tillage practices or both (puddle transferring to un puddled soil dry direct seeding). Three common procedures puddling, which compacts soil to decrease water seepage, transplanting, and standing water are avoided by direct sowing. (Rao *et al*., 2007).

Materials and Methods
The experiment was conducted during rainy (kharif) season in field at Singhania University in Jhunjhunu district (22°57' E, 88°20' N; 9.75 m above mean sea-level) of Rajasthan (lower Gangetic alluvial plains).
Five different varieties i.e., SWARNA, DHANI, KOSHIKARI, 6444GOLD, MTU1010 (Entry #1, Entry2, Entry#3, Entry#4, Entrt#4, Entry #5). The minimum Vegetation was occurred at 6444Gold variety with the application of Pursuit/imazethapyr herbicide was used at 400ml/acre and the specific area for research is 0.8 length x 0.3 width = 0.24 meter square

and used quantity was 1ml/10 metre square. When we use the herbicide as per litres, we get the calculations per volume of water.

3grms/L = altrogen
0.5/L = laudis
2.5ml/L= mero

The treatments include
Treatment 1= UTC,
Treatment 2= 0.024 ml= 24ul,
Treatment 3= 0.048ml= 48ul,
Treatment 4= 0.072ml = 72ul

Observations were made on various attributes, including plant height, plant spread, number of primary branches per plant, stem girth, days to first flower bud appearance, days to first flower opening, days to 50% flowering, flowering duration, fresh weight of flower, shelf life, diameter of flower, carotenoid content, number of flowers per plant and yield per plot. To facilitate this, five plants were randomly chosen from each replication for data collection. Look at the pictures in the (#table1).

Co-efficient of variation (CV)
It is defined as the ratio of the standard deviation to the mean expressed in percentage.

$C.V(\%) = \sigma/x \times 100$ ¯

Critical difference (CD)
To estimate, whether there is a significant difference between two treatments means for each of the character CD at 5 percent level of significance was calculated as:

$C.D = S.E.\ difference\ mean \times t_{0.05}$ (error DF)

Results and Discussion
Plant height is a central part of plant ecological strategy and is strongly correlated with crop duration, growth, and yield. It is a major determinant of a species ability to compete for available resources. All the varieties exhibited a maximum increase in plant height at 60 DAS which was found to be 49 to 80 percent of the plant height at 30 DAS (Table 2). The plant height of Entry #1 shoots up exceptionally up to 80 percent of the that at 30 DAS whereas, in the remaining crops, the increase in plant height was in the range of 49.6 to 63.3 percent of that at 30 DAS. Plant behavioral trait of diminishing growth towards the end of the growing season was noted in all the varieties. The maximum plant height at harvest was 185.7 cm for Entry #2 and the minimum 85.55 cm.

Table 1: Picture representation of all the entries in all developmental stages

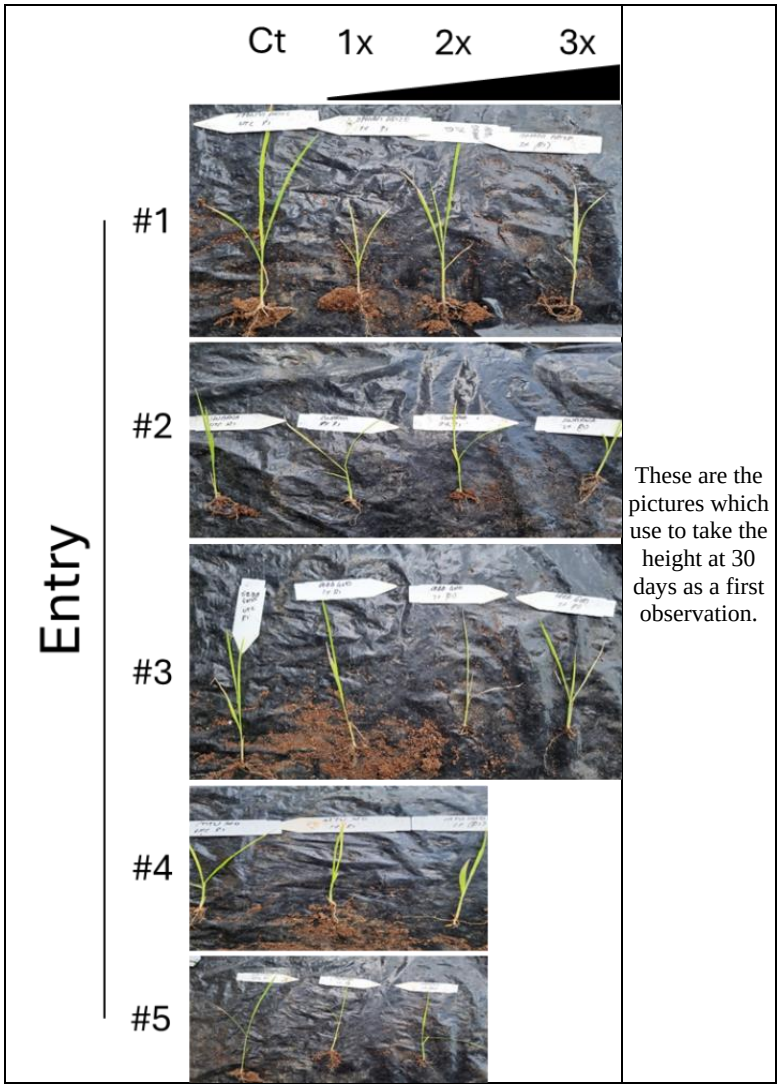

Table 2: Tabular column of plant height at different developmental stage

		Plant height (cm) at different developmental stages											
		30 DAS				60 DAS				At harvest			
		CT	1 X	2X	3X	CT	1 X	2X	3X	CT	1 X	2X	3X
Entry	Entry#1	73.83	77.17	80.58	80.25	75.33	77.58	81.67	79.86	124.17	85.55	91.08	131.25
	Entry #2	42.83	43.5	44.68	44.75	66.15	65.32	65.97	65.72	172.8	129.93	175.93	185.7
	Entry #3	45.7	45.58	45.67	45.53	66.92	65.75	65.75	65.83	124.67	130.1	100.42	134
	Entry #4	76.37	78.5	82.85	79.5	72.88	75.92	81.03	79.5	126.12	131.47	132.33	133.02
	Entry #5	72.42	74.25	77.67	57.85	72.5	76.33	79.17	76.17	74.83	77.42	79.33	76.17

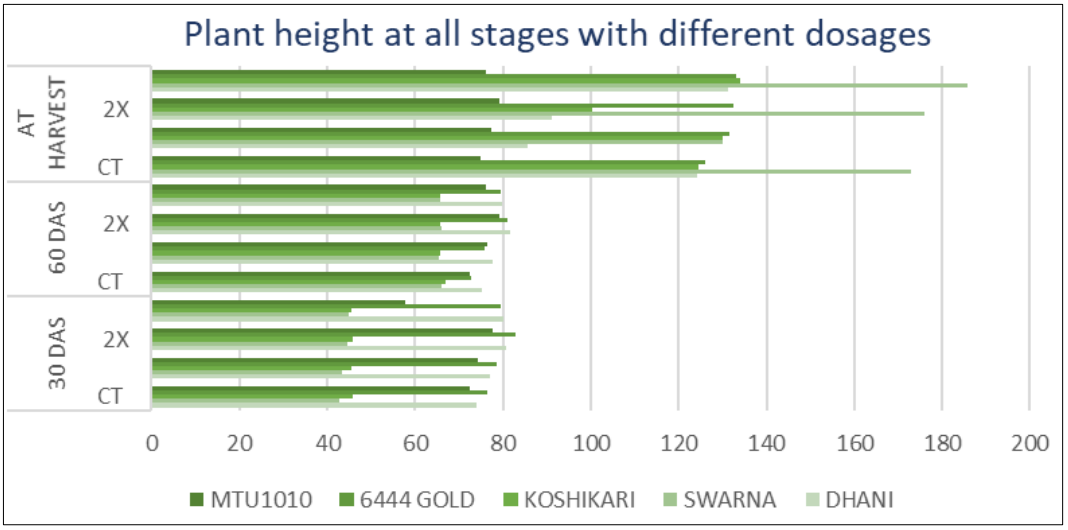

Fig 1: Graphical representation of the Plant height at different developmental stages

Conclusion

From the observations made in the study, it can be concluded that amongst all the varieties Entry #2 were the best in terms of plant height (175 cm (2x), 185 cm (3x) respectively. Thus Entry #1 and Entry #2 are the best lines that can be recommended for kharif sowing in the direct deeded condition with high biomass and seed yield and are also found to be remunerative.

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