Effect of Irrigation and Foliar Nutrition onYield and Economicsof rice Fallow Blackgram

ABSTRACT

Present study highlights the effect of Irrigation and Foliar Nutrition on Yield and Economics of rice Fallow Blackgram. The present investigationwas carried out at the Agricultural College Farm, naira, during the *rabi* season of 2023-24. The experiment was designed as the experiment was laid out in Strip-plot design with 3 main plots *viz.*, M_1- No Irrigation; M_2-Irrigation at flower initiation and M_3-Two irrigations one at flower initiation one at early pod development and 4 Sub Plots *viz.*,S_1- water spray; S_2- 1%19:19:19(NPK); S_3-2% Urea; S_4-2% DAP; S_5-4 ml Nano urea; S_6-3ml Nano DAP with two replications for each treatment. The results showed that irrigation at flower initiation and early pod development stage and foliar spray of 2%DAPat flower initiation and early pod development stage recorded maximum seed yield, haulm yield and economics.

Key words: Irrigation, foliar spray, flower initiation, early pod development, seed yieldand Haulm yield

INTRODUCTION

"Blackgram (*Vigna mungo* L.) is one of the important pulse crop grown throughout the country. It is popularly known as 'Urd bean'. Blackgram needs hot and humid climate for its proper growth and development, hence, grown mainly in kharif season. Black gram is having perfect combination of all nutrients, which includes protein (25-26%), carbohydrate (60%), fat (1.5%), minerals, amino acids as well as vitamins" (Jadhav*et al*., 2017). It is used as nutritive fodder especially for milch cattle. It is also used as a green manuring crop.

India is the world's largest producer and consumer of blackgram by contributing 70 per cent to the global production. Blackgram area accounts for about 15.7 per cent of India's total pulse acreage and contributes 9.09 per cent of total pulse production. India produces approximately 20.5 lakh tonnes of blackgram from 39.43 lakh hectares of land during *kharif* 2021-2022 (Ministry of Agriculture and farmers welfare). The extent of black gram cultivation in Andhra Pradesh 3.45 lakh hectares area with 4.31 lakh tonnes production and the productivity is 1249 kg ha^{-1} in 2022-2023(Directorate of Economics and Statistics, Government of Andhra Pradesh).

When compared to other regions of Andhra Pradesh, the North Coastal Zone's productivity is extremely low. This is primarily because of inadequate management techniques, which include inadequate supplemental irrigation, weed and nutrient control, and low soil fertility combined with limited water retention capacity. In this case, adjusting the production methods is essential to investigating the yield potential and closing the blackgram yield gap. Providing need-based irrigations and supplying nutrients are proven to be essential instruments to increase production in rice fallow blackgram in north coastal Andhra Pradesh, among other crop management strategies. As a result, the yield and economics of the NC zone are the main subjects of this study.

MATERIAL AND METHODS

The present field experiment entitled "effect of irrigation and foliar nutrition on rice fallow blackgram" was conducted during *rabi,* 2023-24 was laid out in field No.157 of Agricultural College Farm, Naira, campus of Acharya N.G. Ranga Agricultural University, Andhra Pradesh, which isgeographically situated at 18.24^0 N latitude, 83.84^0 E longitudes and with an altitude of 27m above mean sea level in the North Coastal Zone of

Andhra Pradesh.The experimental field was homogeneously fertile with even topography and uniform textural make up and was attached to the main irrigation channel connecting the farm tube well for irrigation. Proper drainage facility was also provided to remove excess water during experimental period.

The experiment was laid out in Strip-plot design with 3 main plots *viz.*, M_1- No Irrigation; M_2-Irrigation at flower initiation and M_3-Two irrigations one at flower initiation one at early pod development and 4 Sub Plots *viz.*,S_1-water spray; S_2- 1%19:19:19(NPK); S_3-2% Urea; S_4-2% DAP; S_5-4 ml Nano urea; S_6-3ml Nano DAP with two replications for each treatment. Thinning and gap filling were done as needed and weeding& hoeing were carried out depending on weed intensity at critical stages of crop weed competition.

Five plants were randomly chosen from each replication, and observations were made on them. Replication-wise averages of the readings from these five plants were obtained, and statistical analysis was performed using the mean data. A range of characteristics were measured, including the number of branches per plant, the amount of dry matter accumulated (kg ha-1), the number of pods per plant, the test weight (g), the seed production (kg ha-1), and the haulm yield (kg ha-1). During the growing season, measurements of yield characteristics were made at harvest, while the number of branches per plant and dry matter production were noted at 30-day intervals.

RESULTS AND DISCUSSION

Yield

Irrigation at flower initiation and early pod development recorded highest number of pods plant^{-1} (19.65) number of seed pod^{-1} (6.55). among foliar spray recorded highest number of pods plant^{-1} (20.83), number of seed pod^{-1} (6.84) were recorded in 2% DAP which is statically on par with 1% 19:19:19 (NPK). Irrigation during critical stages improved the crop growth, reduced the flower dropping and favoured more number of pods plant^{-1} and better grain filling. This is in line with the findings of Rahman et al. (2000) reported similar results in chickpea and Nilanthi et al. (2014) in blackgram and Rathika and Ramesh (2016). “The increased in yield might be due to enhanced yield attributes like number of pods plant^{-1}, number of seeds pod^{-1}. It is due to increased uptake of nutrients by blackgram by effective translocation of nutrients from sink to reproductive area of crop. These findings are in agreement” with Subramani and Solaimalai (2000) and Sundari and Sureshkumar (2004)

Seed and haulm yield were remarkably influenced by the irrigation and foliar nutrition (Table 1). Among the main plotsirrigation at flower initiation and early pod development stage recorded maximum seed (941.1 kg ha^{-1}) and haulm yield (1922kg ha^{-1}). Among subplots foliar spray of 2%DAP recorded maximum seed (904.4 kg ha^{-1}) and haulm yield (1896kg ha^{-1}) followed by1% 19:19:19 (NPK) which is stastically on par with 2 ml Nano DAP. “As the Higher yield of mungbean might be owing to the availability of optimum moisture in the root zone of crops through small and repeated irrigation. Optimum moisture condition in the root zone of soil influences the nodulation and availability of different nutrients and helps in achieving better plant growth and yield. The results are in closely conformity with the findings” of Karande*et al*. (2019).

In comparison to the other treatments, foliar application of 2% DAP increased the number of floral buds and inhibited floral shedding by preserving the plants' ideal bio-physiological conditions. This led to a significant rise

in yield parameters, such as the number of pods per plant and test weight. The results of this investigation agree with those of Dayana et al. (2021) and Ramesh T. and Rathika S. (2016)

Economics

"The data on economics for different foliar sprays under imposed irrigation presented in table.2.Higher gross returns (Rs.65877), net returns (Rs. 39177), benefit cost ratio (2.46)wererealized with irrigation at flower initiation and early pod development. Among foliar spray Higher gross returns (Rs. 63308), net returns (Rs. 38008), benefit cost ratio (2.56) were recorded at 2% DAP. The gross returns, net returns, benefit cost ratio are higher from higher seed yield with foliar nutrition because of greater availability of essential nutrients to plant, better translocation of photosynthates leads to higher haulm and grain yield. The similar results were reported" by Martin Stanley (2013).

CONCLUSION

Irrigation at flower initiation and early pod development and Foliar spraying of 2%DAP recorded higher growth and yield attributing parameters of blackgram leading to significant increase in seed and haulm yield**.**

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Table 1: Yield as influenced byirrigation and foliar nutrition on blackgram

Treatments	Seed yield (kg ha^{-1})	Halum yield (kg ha^{-1})
Irrigation		
M_1	640.0	1360
M_2	802.4	1614
M_3	941.1	1922
SEm±	16.97	49.05
CD (p=0.05)	100.4	298.6
CV (%)	7.45	10.4
Foliar nutrition		
S_1	654.9	1484
S_2	891.9	1718
S_3	730.6	1536
S_4	904.4	1896
S_5	704.8	1521
S_6	883.5	1652
SEm±	42.39	52.16
CD (p=0.05)	154.1	189.68
CV (%)	13.16	7.82
Interaction (Mx S)	NS	NS
Interaction (S x M)	NS	NS

Table 2: Economics as influenced by irrigation and foliar nutrition on blackgram

Treatments	Economics		
	Gross returns	Net returns	B:C ratio
Irrigation			
M_1	44800	22300	1.90
M_2	56168	31968	2.32
M_3	65877	39177	2.46
Foliar nutrition			
S_1	45843	22643	1.97
S_2	62433	37833	2.50
S_3	51142	27042	2.12
S_4	63308	38008	2.56
S_5	49336	25336	2.05
S_6	61845	37045	2.49