Eco. Env. & Cons. 29 (1) : 2023; pp. (77-80)
Copyright@ EM International
ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2023.v29i01.010

Influence of sowing time on yield and economics of small millet crops during *kharif* in YSR kadapa district of Andhra Pradesh

E. Aruna*

Agricultural Research Station, ANGRAU, Utukur, Kadapa 516 003, A.P., India

(Received 3 July, 2022; Accepted 22 September, 2022)

ABSTRACT

In the changing climate scenario, millet crops are gaining importance due to factors such as low-maintenance, disease and pest resistance, nutritional benefits, market demand, fodder value and ecological benefits. As farmers especially in dry land areas are showing interest in cultivation of millets, finding out an optimum time of sowing for getting higher yield and good returns has become essential. Hence, the experiment was laid out at Agricultural Research Station, Utukur, Kadapa during *kharif* seasons of 2019 and 2020 to evaluate the performance of small millet crops under different sowing windows. The trial included three sowing windows namely July I F.N, July II F.N, and August I F.N and six millet crops viz., foxtail millet, little millet, brown top millet, proso millet, kodo millet and barnyard millet which were laid out in split plot design with sowing times in main plots and six millet crops in sub plots in three replications. The results indicated that July II F.N is the optimum time of sowing for small millet crops to get higher yield and net returns. Among the different crops sown, kodomillet recorded higher seed yield at different times of sowing followed by brown top millet. Whereas the lowest seed yield was recorded with little millet crop at all the dates of sowing.

***Key words**: Kharif, Small Millet crops, Time of sowing, Productivity*

Introduction

Small millets are the traditional food crops of India since time immemorial which played an important role in food and nutritional security of humankind. India is a leading country in small millets production with an acreage of around 7.0 lakh ha and productivity of 633 kg ha^{-1} (Maitra and Shankar, 2019). These are small-seeded grasses which are hardy and grow well in dry zones as rain-fed crops under marginal conditions of soil fertility. The major millets are sorghum and bajra and other crops like finger millet, little millet, proso millet, brown top millet, barnyard millet, kodo millet and foxtail millet are referred as minor millets which are highly nutritious, non-glutinous and rich in fibre and easy to digest. The ill effects of increasingly erratic rainfall patterns and crop losses due to climate change factors has forced the farmers who were cultivating climate change susceptible crops to shift to millet cultivation, having realized that these crops are much more resilient to environmental stress, giving an assured yield in both low and excess rainfall conditions, while keeping input costs low. With some other added advantages loaded in its favour such as low-maintenance, disease and pest resistance, nutritional benefits, market demand, fodder value and ecological benefits, millets are being considered as smart crops

Senior Scientist (Agronomy)

and have regained their lost pride due to re-evaluation of nutritional qualities (Maitra,2020). Small millets are rich in protein, energy, dietary fibre and having neutraceutical properties (Banerjee and Maitra, 2020). In this era of climate change, which has distorted our weather pattern, millets can be taken up as a redeemer by farmers. The revival of millet cultivation in the southern provinces of Karnataka, Andhra Pradesh and Telangana is a step towards sustainable cropping practices that respects biodiversity in nature. Further the millets known as C4 crops and are highly efficient in absorbing and using carbon dioxide (Brahmachari *et al*.2018). It is well known that the choice of sowing time is an important management option to optimize productivity of the crops. Appropriate sowing time is the important non-monetary input in crop production, which affects the crop growth, yield and quality to a greater extent. Keeping in view of revival of millets in recent times, the present research has been taken up to assess the performance of six different small millets at different sowing windows to find out the best time of sowing during *kharif* in YSR kadapa district which is situated in the dryland tract i.e. Rayalaseema region of Andhra Pradesh.

Materials and Methods

The present experiment on "Performance of small millets under different sowing windows" was conducted during *kharif*, 2019 and 2020 in the farm of Agricultural Research Station, Utukur, Kadapa. The soil of the experimental site was sandy loam in texture with pH of 7.1, electrical conductivity of 0.31 dSm^{-1}, low in organic carbon (0.3%), low in available nitrogen (140 kg ha^{-1}), medium in available phosphorus (63 kg ha^{-1}) and high in available potassium (312 kg ha^{-1}). The treatments included three sowing windows namely July I F.N, July II F.N and august I F.N and six millet crops viz., foxtail millet (Suryanandi), little millet (OLM-203), brown top millet (VZM 1), prosomillet (PM NDL-2), kodo millet (KM NDL-2) and barnyard millet (VL 207) which were laid out in split plot design by allotting sowing times in main plots and cultivars in sub plots with three replications. Different millet crops were sown on respective sowing times by adopting a spacing of 30 cm x 10 cm in the plots of size 3.6 m x 4.0 m under rainfed conditions. Recommended dose of NPK (40-20-10 kg ha^{-1}) was applied through straight fertilizers namely urea, single super phosphate and muriate of potash respectively. Full dose of P_2O_5 and K_2O along with 50 % of nitrogen was applied as basal and remaining 50 % nitrogen was applied at tillering. Two hand weedings were done at 20 and 40 days after sowing and all other cultivation practices were followed as prescribed by the ANGRAU. At the time of harvest, yield data was collected in the net plots by removing border rows. Total monetary returns were calculated based on the prevailing market prices for the produce. The total precipitation received during the crop period at different sowing times is perused at Table 4.

Table 1. Duration of small millet crops as influenced by time of sowing

S. No.	Name of the crop	July I F. N	July II F.N	Aug I F.N
1	Foxtail millet	75	76	78
2	Little millet	88	90	90
3	Brown top millet	105	110	115
4	Proso millet	70	72	72
5	Kodo millet	110	113	115
6	Barnyard millet	78	78	80

Results and Discussion

Effect of time of sowing

Time of sowing significantly influenced the yield of millet crops (Table 2). The results revealed that, the

Table 2. Productivity of small millets as influenced by time of sowing

Crop	July I F.N			July II F.N			Aug I F.N		
	2019	2020	Mean	2019	2020	Mean	2019	2020	Mean
Foxtail millet	1616	1622	1619	1818	1753	1785	1498	1501	1499
Little millet	996	993	995	1075	1095	1085	945	980	962
Brown top millet	1781	1813	1797	1849	1925	1887	1515	1798	1656
Proso millet	1542	1430	1486	1686	1605	1645	1120	1230	1175
Kodo millet	2093	1789	1941	2251	1926	2088	1715	1683	1699
Barn yard millet	1176	1056	1116	1158	1223	1190	1010	998	1004

Table 3.Economics of small millets crops as influenced by time of sowing during *kharif* (Mean data of two years)

Crop	July I F.N				July II F.N				Aug I F.N			
	Yield (kg ha^{-1})	Gross returns	Net returns	BC ratio	Yield (kg ha^{-1})	Gross returns	Net returns	BC ratio	Yield (kg ha^{-1})	Gross returns	Net returns	BC ratio
Foxtail millet	1619	48570	28570	2.42	1785	53550	23550	2.67	1499	44970	24970	2.24
Little millet	995	44775	24775	2.23	1085	48825	28825	2.44	962	43290	23290	2.16
Brown top millet	1797	53910	33910	2.66	1887	56610	26610	2.83	1656	49680	29680	2.48
Proso millet	1486	52010	32010	2.60	1645	57575	37575	2.87	1175	41125	21125	2.05
Kodo millet	1941	58230	38230	2.91	2088	62640	42640	3.13	1699	50970	30970	2.54
Barn yard millet	1116	39060	19060	1.95	1190	41650	21650	2.08	1004	35140	15140	1.75

Foxtail millet –Rs 30/-, little millet – Rs 45/-, Brown top millet – 30/-, Proso millet-Rs 35/-, kodo millet- Rs 30/-, Barnyard millet - Rs 35/-

productivity of millets higher by 12 – 36% in july II F.N sowing compared to august I F.N sowing. Whereas, it was comparable with july I F.N sowing. These results are in conformity with Jyoshna kiranmai *et al*. (2021) and Mubeena *et al*. (2019) who has reported higher seed yield of foxtail millet and proso millet in july II F.N sown crops in Nandyal district of Andhra Pradesh. The better performance of crops when sown at optimum time can be attributed to the favourable weather in terms of rainfall distribution, sunshine hours and congenial temperatures at key developmental stages viz., reproductive and maturity stage of the crops as well as higher rain water use efficiency. Whereas in late sown crops there may the possibility of terminal drought or prolonged dry spells or sometimes wet spells either at flowering and maturity stages of crops which results in drastic reduction in yield. In addition, as millets are short day plants delaying sowing time towards late *kharif* will force the crop to enter into maturity without having sufficient time for proper vegetative growth which affects the yield attributing characters and yield. Triveni *et al*. (2020) reported july I F.N as optimum time for sowing millet crops in coastal region of Andhra Pradesh.

Performance of crops

Among the different millet crops sown, proso millet (60-70 days) matured early whereas, kodo millet matured late (115-120 days) (Table 1). Among the different crops sown, kodo millet recorded higher seed yield at different times of sowing followed by brown top millet. Whereas, the lowest seed yield was recorded by little millet crop in all the dates of sowing.

Interaction effect of date of sowing Vs crops

The data in Table 2 indicates that the performance of all millet crops namely foxtail millet, little millet, brown top millet, proso millet, barnyard millet and kodo millet is better at july II fortnight sowing followed by july I F.N sowing.

Economics

All Millet crops recorded positive net returns in all dates of sowing. But higher net returns and BC ratio was recorded with july II F.N sown crops followed by june I F.N and August I F. N sown crops. Among the different crops sown, higher net returns was recorded with kodo millet in all dates of sowing. It was followed by brown top millet in july II F.N and august I F.N. and proso millet in july I F.N.

From the current study, it was concluded that july II F.N is the optimum time of sowing for getting higher yield and returns in small millet crops such as foxtail millet, little millet, proso millet, barn yard millet, brown top millet and kodo millet duing *kharif*. Based on the rainfall received during both the years, it was clearly observed that millets are climate resilient crops which can be better suited to both dry

Table 4. Amount of rainfall received during the crop period

Year/	2019		2020	
Time of sowing	Rain fall (mm)	Rainy days	Rain fall (mm)	Rainy days
July I F.N	368	23	651	28
July II F.N	388	21	667.4	22
August I F.N	447.4	25	592.8	19

and wet spell conditions.

Acknowledgements

The author is grateful to the Acharya N.G. Ranga Agricultural University, Lam, Guntur for providing financial support for conducting the trial.

Conflict of Interest

There is no conflict of interest.

References

Brahmachari, K., Sarkar, S., Santra, D.K. and Maitra, S. 2018. Millet for food and nutritional security in drought prone and red laterite region of eastern India. *International Journal of Plant & Soil Science.* 26(6): 1-7.

Jyostna Kiranmai, M., Saralamma, S. and Chandra mohan Reddy, C.C. 2021. Assessing the influence of sowing windows on growth and yield of small millets. I*nternational Journal of Current Microbiology and Applied Sciences.* 10(2): 939-944.

Maitra, S. 2020. Potential horizon of brown-top millet cultivation in drylands: A review. *Crop Resesearch.* 55(1&2): 57-63.

Maitra, S. and Shankar. T. 2019. Agronomic management in little millet (*Panicum sumatrense* L.) for enhancement of productivity and sustainability. *International Journal of Biological Sciences*. 6(2): 91-96.

Mubeena , P., Halepyati, A.S. and Chittapur, B.M. 2019. Effect of dates of sowing and nutrient management on uptake and yield of foxtail millet. *International Journal Of Bio Resource And Stress Management.* 10 (1): 92-95.

Triveni, U., Jogarao, P., Anuradha, N., Patro, T.S.S.K. and Sandhya Rani, Y. 2020. Influence of sowing windows on the productivity of small millet crops. *Journal of Phrmacognosy and Phytochemistry*. 9(5): 1291-1294.