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Assessment of different varieties of chickpea (*Cicer arietinum* L.) for enhancing productivity in Sawaimadhopur, Rajasthan

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Abstract
A on farm testing was conducted during 2019-20 and 2020-21 at village Kusthala, Sawaimadhopur on "Assessment of different Varieties of Chickpea for enhancing productivity in Sawaimadhopur, Rajasthan". Results revealed that highest yield, Net return and Benefit-Cost Ratio (BC ratio) was found under GNG-2144 (20.98 and 21.55 q ha^{-1}) which was significantly higher over GNG-1958 and RSG-44. Same trend was observed in terms of No of pods $plant^{-1}$, No of grains pod^{-1} and 100 Seed weight (g) which was found highest in Variety GNG-2144 during both the years. GNG-2144 has 100 Seed weight 14.86 g and 15.46 g during 2018-19 and 2019-20 which was lower than GNG-1958 (22.14 and 23.64 g) during 2018-19 and 2019-20, respectively. Farmers like GNG-2144 due to small seeded with high yielding variety.

Keywords: Chickpea, *Cicer arietinum* L., benefit-cost ratio

Introduction
Chickpea (*Cicer arietinum* L.) is also known as "Gram" or "Bengal Gram". Chickpea is the most important pulse crop of Sawaimadhopur District of Rajasthan. In Rajasthan it has covered 2113139 ha area with productivity of 1072 Kg ha^{-1}. In Sawaimadhopur it hs covered 62735 ha area with productivity of 1887 kg ha^{-1}. (Fourth Advance Estimates, Commissionerate of Agriculture, Rajasthan 2020-21). It is major pulse crop of Rabi in sawaimadhopur. Chickpea seed contains about 18-22% protein and 4-10% fat and 52-70% carbohydrate and traditionally consumed after processing for daal and various purposes. Some recent years yield and productivity of Chickpea was stagnant in Sawaimadhopur district of Rajasthan. Chickpea is cultivating in almost all parts of India as major rainfed crop. The high nutritional values makes Chickpea an important food particularly in femine prone areas of world. Major constraints for lower yield was inappropriate agronomic practices, local varieties, Improper method of sowing, lack of seed treatment, improper pest and disease management (Prasad *et al*., 2022) [8]. Yield is decreasing due to lack of availability of high yielding desi type variety, lack of knowledge about proper integrated crop management practices and pod borer is also a major problem in our area (Kumar *et al*., 2019) [5]. So major requirement of desi type chickpea variety which can used by farmers for daal purpose and get high Economics from it. Keeping all these points in view the present study was carried out to assessment of best suitable variety of Chickpea for enhancing productivity.

Material and Method
A field experiment and assessment was conducted in the two consecutive years during 2019-20 and 2020-21 at farmers field in Village kusthala, Sawaimadhopur, Rajasthan, India. This village was situated in Block Chauth ka barwara in Sawaimadhopur, Rajasthan. Physiological characteristics of experimental field was Sandy loam soil with having pH 9.0 and EC (ds m^{-1}) 0.3 d0s m^{-1}, percent organic carbon was 0.30%, available nitrogen were 243 kg ha^{-1}, available P2O5 20.2 kg $ha^{-1}$and available potash was 247 kgha^{-1}. Experiment conducted in randomized block design concise three different varieties of Chickpea (T1) (RSG-44), (T2) (GNG-1958) and (T3) (GNG-2144) which replicated seven times at farmers field situated nearly to each other. Sowing was done in first week of October during both the years with seed rate of 60 kg ha^{-1} for small seeded variety (RSG-44 and GNG-2144) and 80 Kg ha^{-1} for Bold seeded variety GNG-1958. Sowing was done at spacing of 30×10cm. Application of 20:40 N:P kg ha^{-1} was applied at the time of sowing as basal application in the form of DAP.

Two hand weeding was done manually by labors after 20 and 40 Days after sowing. Irrigation was given as per requirement basically as rainfed crop. The statistical calculation was done by as per analysis of variance described by Gomez and Gomez 1984.

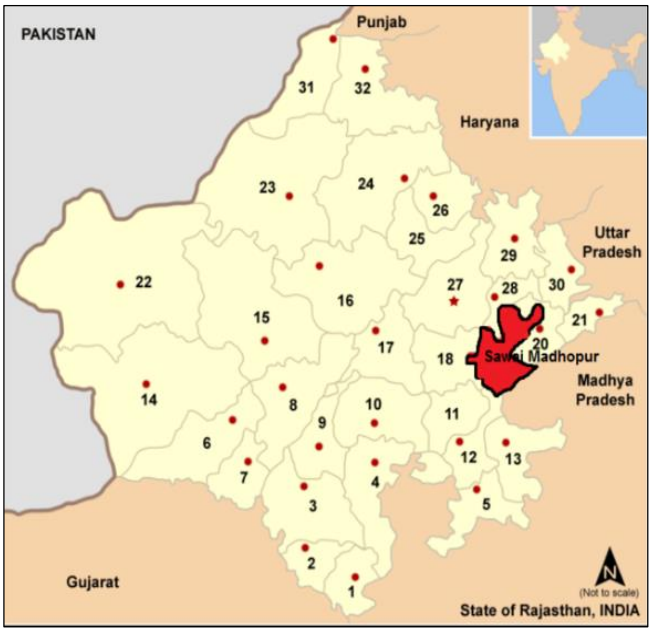

Fig 1: Map of District Sawai Madhopur locating in Rajasthan, India

Fig 2: Map locating the Experimental site placed in Block chauth ka barwara of District Sawaimadhopur, Rajasthan, India

Result and Discussion

No of Pods plant^{-1}

Result presented in table-1 revealed that highest no of pods plant^{-1} (52.14 and 53.14), no of grains pod^{-1} (2.00 and 2.13) was found under (GNG-2144) (T3) during 2019-20 and 2020-21which was significantly higher over (T2) GNG-1958 (39.86 and 48.86) respectively. It may be due to depends on genetic characteristics of variety and soil on which plant grow, climate etc. these results area in close conformity with Choudhary *et al*., 2022 [3], Tiwari, 2016 [9].

100 Seed Weight (g)

Data presented in table-1 revealed that lowest 100 seed weight (12.21 and 14.11 g) was observed under (T1) RSG-44 which was FB (T3) (14.86 and 15.46 g) during 2019-20 and 2020-21 respectively. 100 seed weight in (T2) was found highest 22.14 and 23.64g during 2019-20 and 2020-21 which represents it is bold seeded variety. Farmers in our district doesn't like bold seeded variety due to they have problem in cracking of seeds in threshing and low net return was found. Farmers like small seeded desi type chickpea variety like GNG-2144 because it has low 100 seed weight and small seeded which can be used for daal purpose and high net returns. These results are in close conformity with Kumar *et al*., 2021 [6].

Table 1: Response of different chickpea varieties on No of pods plant^{-1}, No of grains pod^{-1}and 100 seed weight (g)

Variety	No of pods plant^{-1}		No of grains pod^{-1}		100 Seed weight (g)	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Check (RSG-44)	32.86	41.75	1.10	1.01	12.21	14.11
GNG-1958	39.86	48.86	1.06	1.16	22.14	23.64
GNG-2144	52.14	53.14	2.00	2.13	14.86	15.46
SEm ±	2.72	0.69	0.13	0.13	1.52	0.37
CD (P=0.05)	5.92	1.50	0.28	0.30	3.31	0.82

Yield (q ha^{-1})

Results presented in Table -2 showed that highest yield was found under (T_3) (20.98 and 21.55q ha^{-1}) which was significantly higher over (T2) (GNG-1958) (17.46 and 18.17 q ha^{-1}) during 2019-20 and 2020-21, respectively. The yield variation may be due to higher pod bearing ability, higher no of grains per pod and higher photosynthesis ability of particular variety. Similar results were also reported by Nagarjaiah *et al*., (2005) [7] and Choudhary *et al*., 2020 [2]. In comparison to seed yield it was observed that highest vegetative growth and straw yield was observed in variety GNG-1958. Tiwari, 2016 [9] also reported same results.

Net return (Rs ha^{-1}) and BC ratio

Data presented in table-2 showed that highest net return and BC ratio was found under (T3) (69487 and 77977 Rs ha^{-1}) and (2.53 and 2.88) during 2019-20 and 2020-21 which was significantly higher over (T2) GNG-1958 (53192 and 61376 Rs ha^{-1}) and (1.94 and 2.26), respectively. Higher net return and BC ratio was found due to higher seed rate and higher market price was obtained with small seeded desi type chickpea variety.

Table 2: Response of different chickpea varieties on Yield (q ha^{-1}), Net return (Rs ha^{-1}) and BC ratio

Variety	Yield (q ha^{-1})		Net return (Rs ha^{-1})		BC ratio	
	2018-19	2019-20	2018-19	2019-20	2018-19	2019-20
Check (RSG-44)	13.78	14.43	40136	46815	1.71	1.99
GNG-1958	17.46	18.17	53192	61376	1.94	2.26
GNG-2144	20.98	21.55	69487	77977	2.53	2.88
SEm±	0.37	0.26	5535	1308	0.21	0.05
CD (P=0.05)	0.82	0.58	12059	2851	0.45	0.10

Conclusion

On the basis of two year data of 2019-20 and 2020-21 it has been concluded that (T3) GNG-2144 found to be better variety and best suitable variety of Desi type Chickpea for Sawaimadhopur District of Rajasthan which gave highest seed yield, net return and BC ratio.

Conflict of interest
Authors have declared that no competing interests exist.

Authors contributions
All authors have same contribution in this experiment in collection, analysis of data.

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