Biological Forum – An International Journal **13(2): 629-632(2021)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Performance of Cowpea variety TPTC 29 in Western mandals of Chittoor dt.

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(Received 13 May 2021, Accepted 06 July, 2021)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: In Chittoor dt, Cowpea has been grown in an area of 200 ha. But farmers are growing local non-descriptive varieties which are highly susceptible to pests and diseases and also pod and seed size are smaller which is reducing market value and also increasing cost of cultivation. In order to overcome these problems a new variety of Cowpea TPTC 29 (Tirupati Cowpea 1), released in the year 2017 by RARS, Tirupati was introduced in the district by Krishi Vigyan Kendra Kalikiri by conducting On Farm Trials and Front Line Demonstrations in farmers fields. This variety matures in 80-90 days, not sensitive to light. It is used as vegetable and also for seed purpose because of its long pod and bold seed. It has yield potential of 1000-1100 kg/ha. KVK, Kalikiri assessed the performance of TPTC 29 over Meghana in Front Line Demonstrations from 2018-19 to 2020-21. Yield attributes and yield are higher in TPTC 29 compared to Meghana. Yield of TPTC 29 and Meghana were 9.0 q ha^{-1} and 7.7 q ha^{-1} respectively. Net returns and B:C ratio of TPTC 29 28763 Rs ha^{-1} and 1:2.15, respectively. Whereas, Meghana recorded net returns and B:C ratio of 20263 Rs ha^{-1} and 1:1.79, respectively.

Keywords: Cowpea, Yield, Economics.

INTRODUCTION

In Andhra Pradesh state Cowpea is a major grain legume crop. It is one of the major and cheap protein sources for rural as well as urban people. Cowpea leaves can be used for fodder purpose, green pods can be consumed as vegetable and the dried seed is used for consuming by preparing different food products and also for seed purpose. Protein content of cowpea leaves range from 27 to 43% and protein concentration of the dry grain range from 21 to 33% Ahenkora *et al*., (1998); Ddamulira *et al*., (2015); Abudulai *et al*., (2016). Cowpea is a valuable source of livestock fodder making the dual purpose cultivars very attractive to farmers Singh *et al*., (2003); Kamara *et al*., (2012). It is drought tolerant and adapted to stressful environments where many crops fail to grow well Bisikwa *et al*., (2014); Ddamulira *et al*., (2015). Cowpea can fix about 40 kgN/ha from nodules in the presence of right rhizobia strain of, which can satisfy the crop nitrogen (N) requirements (Singh, 1997). There are some reports indicating that in poor soils, cowpea hardly satisfies N requirements but the crop performance is improved by fertilizing (Chiezey *et. al.*, 1990). The nutritional value of cowpea plant parts varies greatly depending on the variety (Sebetha *et al.*, 2010). Cowpea is being grown in an area of 109.8 lakh ha with production and productivity of 56.35 lakh tonnes and 513 kg/ha, respectively in world (FAO Stat). It is grown over an area of 0.5 million ha in India (Rajpoot and Rana 2016). Chittoor dt is one of the important cowpea growing districts of Andhra Pradesh. The crop is cultivated in 1643 ha during *Kharif*, 2020-21 and 132 ha during *Rabi*, 2020-21 in Chittoor dt. In western mandals of Chittoor dt, farmers are growing varieties with long duration. Further, the farmers are obtaining lower yields due to poor performance of local un-descriptive varieties and also local varieties are long duration. Many cultivars have short growing cycle maturing within 60 to 80 days and make them suitable for drought-prone regions (Boahen *et al*., 2017). The overall low yield potential of cowpea is mainly attributed to limited attention by research and development programmes, severe attacks of pest complexes, low soil fertility, drought, poor management practices, marketing problems, and poor technology dissemination and popularization (Kebede *et al.*, 2020). To mitigate the problems, a new variety of Cowpea TPTC 29 released by RARS, Tirupati in the year 2017 which has high yield potential was introduced in the dist. by KVK, Kalikiri. This variety matures in 80-90 days, not sensitive to light (https://www.rarstpt.org/files/rars/Research_Varieties.pdf). It is used as vegetable and also for seed purpose because of its long pod and bold seed. It has yield potential of 1000-1100 kg/ha. (http://dpd.gov.in/Varieties/ARID%20LEGUMES%20VARIETIES.pdf) Performance of this variety was not tested under different soils and climatic conditions. So the KVK, Kalikiri assessed the performance of TPTC 29 over Meghana in Front Line Demonstrations during 2018-19 to 2020-21 under assured irrigation conditions in different soils and climatic conditions in farmers fields.

Pulses are an important group of food crops that can play a vital role to address national food and nutritional security and also tackle environmental challenges. The share of pulses to total food grain basket is around 9-10 per cent and is a critical and inexpensive source of plant-based proteins, vitamins and minerals. Pulses are critical in food basket (dal-roti, dal-chawal), are a rich source of protein (@20-25 per cent, it is double the protein content of wheat and thrice that of rice) and help address obesity, diabetes malnutrition etc (success report 2018-19). Indian Farmin April 2016

MATERIALS AND METHODS

1. Place of study: Villages in western mandals of Chittoor district
2. Area: 4.0 ha during 2018-19, 4.0 ha during 2019-20, 4.0 ha during 2020-21
3. Number of farmers: 10 farmers during 2018-19, 10 farmers during 2019-20, 10 farmers during 2020-21
4. Design: Front Line Demonstration in farmers fields in western mandals of Chittoor dt.
5. Year and season: 2018-19 to 2020-21 and *Rabi*
6. Treatments:
T1: TPTC 29
T2: Meghana
7. Data recorded:
a.Plant population/sq.m
b. Number of pods/plant
c. Number of seeds/pod
d. Pod length (cm)
e. Fresh pod weight (g)
f. Dry pod weight (g)
g. Fresh 100 seed weight (g)
h. Dry 100 seed weight (g)
8. Yield
Economics was calculated by using following formulae:
Cost of cultivation (Rs ha^{-1})
Based on the charges of agricultural operations during the study period and market prices of inputs cost of cultivation was calculated.
Gross returns (Rs ha^{-1})
Gross return (Rs ha^{-1}) = (Seed yield × price)
Net returns (Rs ha^{-1})
Net returns (Rs ha^{-1}) = Gross return (Rs ha^{-1}) - Cost of cultivation (Rs ha^{-1})
Cost: benefit ratio

$$\text{Cost : benefit ratio} = \frac{\text{Gross returns (Rs ha}^{-1})}{\text{Cost of cultivation (Rs ha}^{-1})}$$

RESULTS AND DISCUSSION

Yield attributes: Perusal of the data in Table 1 and 2 revealed that on an average no. of pods/plant in TPTC 29 and Meghana were 11.5 and 13.0, respectively. No. of seeds/pod in TPTC 29 was 10.9 and Meghana was 10.8. Pod length of TPTC 29 and Meghana was 21.7 and 16.2, respectively. It has been concluded that there is significant difference at 1% level between TPTC 29 and Meghana with regard to fresh pod weight and dry 100 seed weight as per Table 3 and 4. The improved varieties have high seed weight, which is an essential factor that farmers consider when choosing a variety to adopt (Gondwe *et al*., 2019).

Table 1: Yield attributes of TPTC 29 and Meghana varieties of cowpea.

Year	Plant population/sq.m		No. of pods/plant		No. of seeds/pod		Pod length (cm)	
	TPTC 29	Meghana	TPTC 29	Meghana	TPTC 29	Meghana	TPTC 29	Meghana
2018-19	12.0	12.0	11.6	13.8	10.4	10.1	23.0	18.0
2019-20	12.0	12.0	11.5	12.8	11.0	11.0	20.5	15.4
2020-21	12.0	12.0	11.4	12.3	11.2	11.3	21.6	15.1
Mean	**12.0**	**12.0**	**11.5**	**13.0**	**10.9**	**10.8**	**21.7**	**16.2**

Table 2: Pod and seed weight of TPTC 29 and Meghana varieties of Cowpea.

Year	Fresh pod weight (g)		Dry pod weight (g)		Fresh 100 seed weight (g)		Dry 100 seed weight (g)	
	TPTC 29	Meghana	TPTC 29	Meghana	TPTC 29	Meghana	TPTC 29	Meghana
2018-19	10.2	5.5	4.9	2.9	34.5	26.4	19.2	15.5
2019-20	10.2	5.4	4.9	2.7	34.0	27.2	20.7	17.1
2020-21	10.4	4.9	5.2	2.9	38.1	26.1	20.8	16.4
Mean	**10.3**	**5.3**	**5.0**	**2.8**	**35.5**	**26.6**	**20.2**	**16.3**

Table 3: Summary of t-test in comparing fresh pod weight in treatment and farmers practice for three years.

	Treatments	N	Mean	Std. Deviation	t-value	p-value
2018-19	TPTC 29	5	10.2	0.31	20.42**	0.000
	Meghana	5	5.5	0.41	20.42**	0.000
2019-20	TPTC 29	5	10.2	0.34	20.28**	0.000
	Meghana	5	5.4	0.41	20.28**	0.000
2020-21	TPTC 29	5	10.4	0.29	37.95**	0.000
	Meghana	5	4.9	0.14	37.95**	0.000

*Significant at 5% level **Significant at 1% level

Table 4: Summary of t-test in comparing Dry 100 seed weight in treatment and farmers practice for three years.

	Treatments	N	Mean	Std.Deviation	t-value	p-value
2018-19	TPTC 29	5	19.2	0.79	9.65**	0.000
	Meghana	5	15.5	0.34	9.65**	0.000
2019-20	TPTC 29	5	20.7	0.67	8.03**	0.000
	Meghana	5	17.1	0.74	8.03**	0.000
2020-21	TPTC 29	5	20.8	0.54	14.83**	0.000
	Meghana	5	16.4	0.38	14.83**	0.000

*Significant at 5% level **Significant at 1% level

Yield: Perusal of the data presented in the Table 5 and Fig. 1 revealed that in demo plot, yield was found to be significantly higher than in control (farmers practice) during all the years (2018-19 to 2020-21). TPTC 29 recorded mean yield of 9.0 q/ha. Whereas, Meghana recorded mean yield of 7.7 q/ha. Yield difference between TPTC 29 and Meghana was significant at 1% level as per Table 6. The higher yield resulted due to more number of pods per plant and 100 seed weight as it is one of the important yields attributing character.

Economics: Perusal of the data presented in the Table 5 revealed that gross returns, net returns and C: B ratio were substantially higher in demo plot (TPTC 29) compared to farmers practice-check variety (Meghana). Mean gross returns of TPTC 29 were 54000 Rs ha^{-1}. Whereas, in check plot, gross returns were 46000 Rs ha^{-1}. Mean net returns of TPTC 29 were 28763 Rs ha^{-1}. Mean C: B ratio of TPTC 29 was 1:2.15. Mean net returns in control plot were 20263 Rs ha^{-1} and mean C: B ratio was 1:1.79. During all the three years it has been concluded that there is significant difference between TPTC 29 and Meghana with regard to B:C ratio at 1% significant level as per Table 7. Higher net returns and C: B ration in TPTC 29 were due to higher yields.

Table 5: Yield and economics of improved variety TPTC 29 and check variety Meghana.

Year	Yield (q ha-1)		% increase in yield over check	Gross returns (Rs ha-1)		Net returns (Rs ha-1)		B: C ratio	
	TPTC 29	Meghana	TPTC 29	Meghana	TPTC 29	Meghana	TPTC 29	Meghana	TPTC 29
2018-19	9.2	8.1	13.6	55200	48600	27700	21600	2.01	1.80
2019-20	8.9	7.5	18.7	53400	45000	28400	20000	2.14	1.80
2020-21	8.9	7.4	20.3	53400	44400	30190	19188	2.30	1.76
Mean	9.0	7.7		54000	46000	28763	20263	2.15	1.79

Table 6: Summary of t-test in comparing yield in treatment and farmers practice for three years.

	Treatments	N	Mean	Std.Deviation	t-value	p-value
2018-19	TPTC 29	5	9.2	0.44	5.44**	0.001
	Meghana	5	8.1	0.13	5.44**	0.003
2019-20	TPTC 29	5	8.9	0.26	4.16**	0.003
	Meghana	5	7.5	0.73	4.16**	0.009
2020-21	TPTC 29	5	8.9	0.64	3.67**	0.006
	Meghana	5	7.4	0.62	3.67**	0.006

*Significant at 5% level **Significant at 1% level.

Table 7: Summary of t-test in comparing B:C ratio in treatment and farmers practice for three years.

	Treatments	N	Mean	Std.Deviation	t-value	p-value
2018-19	TPTC 29	5	2.01	0.009	12.63**	0.000
	Meghana	5	1.80	0.035	12.63**	0.000
2019-20	TPTC 29	5	2.14	0.024	9.15**	0.000
	Meghana	5	1.80	0.079	9.15**	0.000
2020-21	TPTC 29	5	2.30	0.187	6.03**	0.000
	Meghana	5	1.76	0.067	6.03**	0.002

*Significant at 5% level **Significant at 1% level

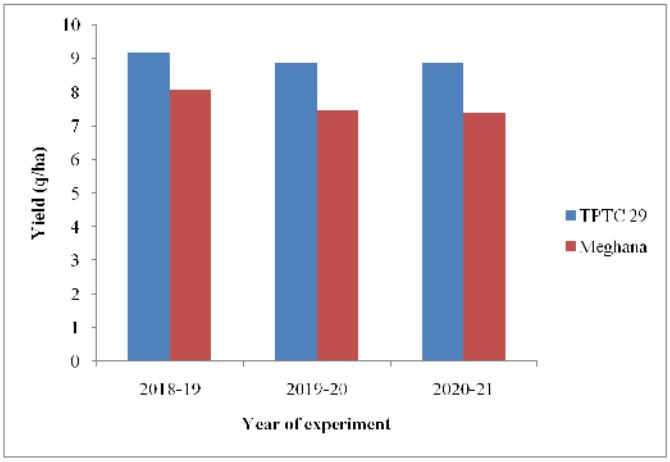


Fig. 1. Performance of TPTC 29 over Meghana in Western mandals of Chittoor dt.

Critical observations in TPTC 29 compared to Meghana:

- Higher pod length and bold seeds
- Higher 100 seed weight
- No incidence of Yellow Mosaic Virus
- Good crop cover that resists erosion and weed growth,
- Huge demand in market due to its boldness

Output:

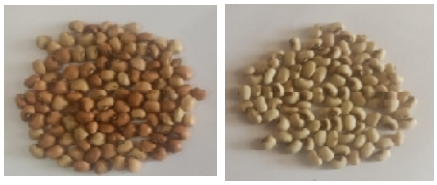
- Average grain yield was 8.77 q/ha (11.3% higher than Meghana)
- Gross returns were 5.23% high over Meghana
- Net returns were 10.88% high over Meghana
- Favourable benefit: cost ratio of 2.47 over 2.28 in Meghana

Meghana TPTC 29

Image 1: Pods of Meghana and TPTC 29.

Meghana TPTC 29

Image 2: Fresh seed of Meghana and TPTC 29.



TPTC 29 Meghana

Image 3: Dry seed of TPTC 29 and Meghana.

CONCLUSION AND FUTURE SCOPE

Local variety Meghana is highly susceptible to pests and diseases which increased the cost of cultivation and also fetched less market value because of its smaller seed and pod size. TPTC 29 performed well compared to Meghana. Pod length, pod weight, seed size, seed weight of TPTC 29 are higher than Meghana which resulted in higher yield compared to Meghana variety which is locally grown by farmers. In future this variety can spread in the entire state more rapidly.

Acknowledgement. The authors are thankful to the Associate Director of Research, RARS, Tirupati, Director of Extension, ANGRAU for providing the necessary facilities and the Director of ATARI zone X, Hyderabad for providing financial support in carrying out the present investigation.

Conflict of Interest. Nil.

REFERENCES

Abudulai, M., Seini, S. S., Haruna, M., Mohammed, A. M., & Asante, S. K. (2016). Farmer participatory pest management evaluations and variety selection in diagnostic farmer field Fora in cowpea in Ghana. *Afr. J. Agric. Res., 11*: 1765–1771.

Ahenkora, K., Dapaah, H. A., & Agyemang, A. (1998). Selected nutritional components and sensory attributes of cowpea (*Vigna unguiculata* [L.] Walp.) leaves. *Plant Foods Hum. Nutr., 52*: 221–229.

Boahen, S. K., Savala, C. E. N, Chikoye, D., & Abaidoo, R. (2017). Growth and Yield Responses of Cowpea to Inoculation and Phosphorus Fertilization in Different Environments. *Front. Plant Sci., 8*: 646.

Chiezey, U. F, Katung, P. D., & Yayock, J.Y. (1990). Response of cowpea (*V. unguiculata* (L.) Walp.), var. sampea-7 to nitrogen and phosphorus following a maize crop. *Samaru Journal of Agricultural Education, 4*(1): 161-168.

Ddamulira, G., Santos, C. A. F., Obuo, P., Alanyo, M., & Lwanga, C. K. (2015). Grain yield and protein content of Brazilian cowpea genotypes under diverse Ugandan environments. *Am. J. Plant Sci., 6*: 2074–2084.

Kebede, E. Bekeko, Z., & Moral, M. T. (2020). Expounding the production and importance of cowpea (*Vigna unguiculata* (L.) Walp.) in Ethiopia, Cogent. *Food & Agriculture, 6*: 1.

Gondwe, T. M., Alamu, E. O., & Mdziniso, P. (2019). Cowpea (*Vigna unguiculata* (L.) Walp) for food security: an evaluation of end-user traits of improved varieties in Swaziland. *Sci. Rep., 9*: 15991.

http://dpd.gov.in/Varieties/ARID%20LEGUMES%20VARIETIES.pdf

https://www.rarstpt.org/files/rars/Research_Varieties.pdf

http://www.faostat.fao.org/

Kamara, A.Y., Ewansiha, S. U., Ajeigbe, H. A., Okechukwu, R., Tefera, H., & Boukar, O. (2012). "Improvement in grain and fodder yield of cowpea (*Vigna unguiculata*) varieties in the Sudan savannas of Nigeria over the past four decades", In *Innovative Research Along the Cowpea Value Chain*. *International Institute of Tropical Agriculture* (IITA): 179–188.

Rajpoot, S. K., & Rana, D. S. (2016). Crop Diversification with Vegetable Cowpea for improving productivity, resource-use efficiency, soil and human health. *Indian Farming, 66*(1): 05–09.

Sebetha, E. T., Ayodele, V. I., Kutu, F. R., & Mariga, I. K. (2010). Yields and protein content of two cowpea varieties grown under different production practices in Limpopo province, South Africa. *African Journal of Biotechnology, 9*(5): 628-634.

Singh, B. B. (1997). Performance of promising cowpea varieties at Minjibir pp14-15. IITA, Annual report 1997. Project II Cowpea Cereals Systems Improvement in the Savanna.

Singh, B. B., Ajeigbe, H. A., Tarawali, S.A., Fernandez-Rivera, S., & Abubakar, M. (2003). Improving the production and utilization of cowpea as food and fodder. *Field Crop Res., 84*: 169–177.

How to cite this article: Deva, S., Mallikarjun, M., Ravuri, P.L. and Kumar, M.R. (2021). Performance of Cowpea variety TPTC 29 in Western mandals of Chittoor dt. *Biological Forum – An International Journal, 13*(2): 629-632.