The Pharma Innovation Journal 2022; 11(7): 3348-3351

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 3348-3351

www.thepharmajournal.com
Received: 14-05-2022
Accepted: 24-06-2022

Kabilan M
PG Scholar, Department of Agronomy, TNAU, Coimbatore, Tamil Nadu, India

S Manickam
Professor and Head, Tapioca and Castor Research Station, Yethapur, Telangana, India

S Vincent
Special Officer, Vigilance and Disciplinary Action, TNAU, Coimbatore, Tamil Nadu, India

G Senthilkumar
Assistant Professor, Department of Agronomy, TNAU, Coimbatore, Tamil Nadu, India

Corresponding Author:
Kabilan M
PG Scholar, Department of Agronomy, TNAU, Coimbatore, Tamil Nadu, India

Evaluation of traditional rice cultivars under various cultivation practices

Kabilan M, S Manickam, S Vincent and G Senthilkumar

DOI: https://doi.org/10.22271/tpi.2022.v11.i7ap.14534

Abstract
A field experiment was carried out in wet land farms, Tamil Nadu Agricultural University, Coimbatore during 2021-22 at *Navarai* season, to study the performance of traditional rice cultivars under various cultivation practices. The experiment was laid out in split plot design with two replications. The main plot consisted of three cultivation practices (organic practices, inorganic practices and control) and sub plots consisted of eleven rice cultivars. The data related to growth attributes, yield and yield attributes were collected and statistically analyzed. The organic cultivation practices showed better growth, yield attributes and yield in traditional cultivars than check (Co 51). All the traditional cultivars performed better under organic cultivation practices than inorganic and control. The higher grain and straw yield were noticed in C_{11} (Co 51) about 3730 kg ha^{-1} whereas among the traditional rice cultivars *Annamazhagi* (C_1) recorded maximum grain yield of 2712 kg ha^{-1} and C_{10}-*Varappukudaichan* recorded significantly maximum straw yield of 7354 kg ha^{-1}. Meanwhile lower grain yield of 2122 kg ha^{-1} noted in *Ottukitchili* (C_6) and lower straw yield of 5872 kg ha^{-1} were observed in C_{11} (Co 51) among traditional rice cultivars C_2-*Arupatham kuruvai* noted the lowest straw yield of 6005 kg ha^{-1}. The results revealed that all the ten Traditional rice cultivars were performed better and gave positive response under organic cultivation practices than inorganic and control practices. In order to usage of traditional cultivars and their importance, need in regular diet and consumption is still less, however, this study helps to produce organic and good quality traditional rice cultivars with proper cultivation practices to make them available to the market.

Keywords: Traditional rice cultivars, organic production package, Annamazhagi, Karuthakaar

Introduction
The most important necessity for maintaining human existence is food. If a person had wholesome nourishment, they would be able to survive even if they lacked clothing and shelter. More than half of the world's population relies on rice (*Oryza sativa* L.), an important agricultural crop, as their primary source of calories and protein on a daily basis. It provides around 21% of the world's total dietary calories, 14% of the protein and 14% of the fat (Kennedy and Burlingame, 2003) [5].Paddy is available in a wide range of colours including black, brown, red and purple. For their health advantages, the colourful rice varieties are regarded as important. White rice that has been milled or polished contains less nutrition than unpolished rice with its bran. However, the fact that brown rice has important nutritious content, consumers prefer to eat polished white rice (Devi *et al.*, 2015) [3]. The Thirukkural, written by the renowned Tamil poet Thiruvalluvar, has the famous line, "To dump manure is better than to plough". Now days, food grown organically is becoming more and more in demand across the world. Organic farming has an objective to encouraging and enhancing the health, biodiversity and soil biological activities of agro-ecosystem (Chouichom and Yamao, 2010) [2]. Adoption of organic agriculture would help to mitigate the problems connected with input intensive conventional agriculture (Wheeler, 2008). Conventional farming has resulted in negative effect on the environment, presence of toxic residues in food and an overall reduction in quality of food which have resulted in more diseases.
Locally farmed rice cultivars (traditional varieties) have been proved the availability of high grain protein, carbohydrate and ash content (Fernando, 2013) [4]. Recent past, research on rice crop in the nation is mainly focused on improving yield, pest and disease resistance of crop, and lack of importance is given to cultivate the traditional rice varieties and evaluate its suitable season, management option for better establishment and production. With all of the above facts in mind, a field experiment was conducted to investigate the impact of organic nutrient sources on traditional rice cultivars growth and yield.

Materials and Method
In the Wetland farms of the Tamil Nadu Agricultural University, a field research was carried out in field number B8 (inorganic field) and O8 (organic field). The sowing was taken in

nursery at navarai season (December 2021 to January 2022). The experiment was laid out in a split plot design with three main plots and twelve sub plots which were replicated twice. The main plot consist of C_1-*Annamazhagi*, C_2-*Arupathamkuruvai*, C_3-*Chithiraikaar*, C_4-*Kallurundaiyan*, C_5-*Karuthakaar*, C_6-*Ottukitchili*, C_7-*Salem samba*, C_8-*Sigappu kuruvaikaar*, C_9-*Thirunelvelikitchili*, C_{10}-*Varappukudainchan*, C_{11} - Co 51 (Check). Organic production practices is one of the main plot treatment, in that seeds of each traditional rice cultivars were treated with *Bacillus subtilis* @ 10 g kg^{-1} + *Azospirillum* @ 30 g kg^{-1} + *Phosphobacteria* @ 30 g kg^{-1} and soaked in water for 12 hours then seeds were collected and covered by paddy straw in a dark room for 24 hours. Then pre-germinated seeds were sown in the sunken nursery bed. Gypsum was applied @ 100 g m^{-2} at 10 days after sowing to prevent root snapping. Neem cake @ 250 kg ha^{-1}, Gypsum @ 500 kg ha^{-1} (source of Calcium and Sulphur nutrients) were applied at last ploughing. Application of *Azospirillum* @ 2 kg + *Phosphobacteria* @ 2 kg mixed with 25 kg of FYM was applied to main field before transplanting. The 18 days old seedlings were uprooted and dipped with *Azospirillum* (1 kg ha^{-1}) + *Phosphobacteria* (1 kg ha^{-1}) in 40 liters of water for 15-30 minutes before transplanting. With 25 x 25 cm spacing, seedlings were transplanted to the main field. Vermicompost was applied @ 1000 kg ha^{-1} at active tillering, panicle initiation and flowering stages. Panchagavya was sprayed @ 30 ml l^{-1} of water twice at 30 and 45 DAT as a growth promoter.

Results and Discussion

Plant growth parameters

The results pertaining to plant height, drymatter production and LAI at flowering stage are presented in Table 1. The growth attributes of plant height, dry matter production (DMP) and Leaf Area Index (LAI) were recorded at flowering stage. Plant height is the visible indicator of growth. A significant difference was noticed with regards to plant height, DMP and LAI at flowering stage due to production packages.

Among the main plot treatments, P_1 (Organic production package) recorded significantly maximum plant height, DMP and LAI when compared to P_2 (Inorganic production package) and P_3 (control). Concerning subplots (different rice cultivars), the maximum plant height was recorded in C_5 (134.41 cm) which was on par with C_8 (130.38 cm) meanwhile the lowest plant height was observed in C_6 (90.20 cm) which was on par with C_{11} (88.36 cm). The maximum DMP was noted in C_1 (11264 kg ha^{-1}) which was on par with C_{10} (10768 kg ha^{-1}) and C_4 (10590 kg ha^{-1}) meanwhile the lowest DMP was recorded in C_9 (6847 kg ha^{-1}). The higher LAI was noted in C_1 (4.18) and lower LAI was observed in C_2 (2.87). The similar finding was reported by Ramesh *et al.* (2019) [7] in traditional variety of Mapillai samba which registered significantly maximum plant height of 129.30 cm, LAI of 7.84 and DMP of 6195 kg ha^{-1}. The least values of plant height of 98.71cm in Seeraga samba, number of 11.83 tillers $hill^{-1}$ in Mapillai samba and LAI of 6.80 cm and DMP of 5370 kg ha^{-1} registered under Illupai poo samba. As like Devkota *et al*. (2019) stated the maximum growth parameters by application of organic manure alone compared to inorganic manure alone. The variation of the plant height, tillers number and LAI among the varieties may be due to the ability and genetic trait of the variety with response to nutrient supply. These findings were in accordance with Ranabhat and Amgain (2016) [8].

Yield attributes and yield

Organic production packages gave the significant increase of yield and yield parameters in different rice cultivars when compared to inorganic and control production packages. Tables 2&3 display the results for yield parameters and yield in traditional rice cultivars.

Among the rice cultivars, maximum number of filled grains $panicle^{-1}$ (113.53) and maximum length of panicle (19.56 cm) was registered under C_{10} and minimum number of ill-filled grain $panicle^{-1}$ (17.35) was noted in C_9. Meanwhile the less number of filled grains per $panicle^{-1}$ (62.35) recorded in C_2 and lower panicle length (16.52 cm) was obtained in C_1 and maximum number of ill filled grain $panicle^{-1}$ (19.43) observed in C_6. The varieties derived from the various parental origins maintained the wide variability in yield attributing factors. The genetically regulated phenomena are attainments of particularly greater or lower yield assigning character among varieties. These were in line with findings of Otung (2014) [6].

In respect of grain and straw yields, C_{11} (Check) noted the maximum grain yield of 3730 kg ha^{-1} and among traditional cultivars C_1-*Annamazhagi* recorded maximum grain yield of 2712 kg ha^{-1} and C_{10} - *Varappukudaichan* recorded significantly maximum straw yield of 7354 kg ha^{-1}. Meanwhile lower grain yield of 2122 kg ha^{-1} noted in *Ottukitchili* (C_6) and lower straw yield of 5872 kg ha^{-1} were observed in C_{11} (Co 51) among traditional rice cultivars C_2-*Arupatham kuruvai* noted the lowest straw yield of 6005 kg ha^{-1}. The similar findings of grain and straw yield of traditional rice was recorded by Ramesh *et al*. (2019) [7]. Ameen *et al*. (2017) [1] reported the application of compost manure + gypsum increase the rice yield compare to control. Several organic bio-fertilizers such as *panchagavya* and *Beejamrutha* are shown to be effective by enriching the soil for improving the crop yield (Sreenivasa *et al*., 2011) [9].

Conclusion

In contrast to inorganic production packages, these traditional rice cultivars are responding favourably to and adaopting them. Though traditional red rice varieties originated in India and are widely used by both traditional healers and the general public as a part their cultural heritage, their practical applications and health benefits in terms of current scientific methodology are few and far between. Because there isn't enough information available, most people are still unaware of these type's health benefits. Stakeholders must push for comprehensive research on these native coloured variations in order to make them available to consumers as special functional foods or as a regular part of their diet.

Table 1: Effect of production packages on growth parameters at flowering stage in traditional rice cultivars

Treatments	Plant height (cm)				Leaf Area Index				Drymatter production (kg ha^{-1})			
	P_1	P_2	P_3	Mean	P_1	P_2	P_3	Mean	P_1	P_2	P_3	Mean
C_1	136.06	121.92	96.91	118.30	5.44	5.04	2.07	4.18	15882	13298	4612	11264
C_2	112.42	104.55	89.03	102.00	3.71	3.29	1.62	2.87	13363	11184	5588	10045

C_3	134.48	123.88	98.49	118.95	5.26	4.82	1.55	3.88	10749	9758	5675	8727
C_4	130.33	123.15	99.06	117.51	5.36	4.75	1.08	3.73	14974	12330	4468	10590
C_5	158.90	140.75	103.58	134.41	5.17	4.76	1.19	3.71	12442	10258	4948	9216
C_6	99.77	95.42	75.42	90.20	4.09	3.63	1.34	3.02	11533	10216	4185	8645
C_7	143.78	133.25	92.12	123.05	5.55	5.02	1.86	4.14	11350	10090	5119	8853
C_8	158.66	142.70	89.77	130.38	5.65	5.07	0.95	3.89	11587	10108	5822	9172
C_9	133.52	120.40	82.66	112.19	5.36	4.97	1.65	3.99	8792	7729	4020	6847
C_{10}	136.97	125.85	99.06	120.63	5.64	4.84	1.07	3.85	14179	12724	5402	10768
C_{11}	95.45	91.95	77.67	88.36	3.17	2.99	1.01	2.39	10909	9224	3996	8043
Mean	130.94	120.35	91.25		4.94	4.47	1.40		12342	10629	4894	
	P	C	P x C	C x P	P	C	P x C	C x P	P	C	P x C	C x P
S.Ed	1.96	4.20	5.78	6.89	0.06	0.24	0.31	0.33	289.3	335.6	567.8	793.2
CD(0.05)	8.42	8.57	11.55	15.02	0.27	0.49	0.61	0.71	1244.6	685.4	1133.6	1728.2

Treatment Detail

P_1 - Organic production packages (NPOF)		**P_2-TNAU recommended inorganic package of practices**			**P_3-Control**
C_1-*Annamazhagi*	C_2-*Arupatham kuruvai*	C_3-*Chithiraikaar*	C_4-*Kallurundaiyan*	C_5-*Karuthakaar*	C_6-*Ottukitchili*
C_7-*Salem samba*	C_8-*Sigappu kuruvaikaar*	C_9-*Thirunelveli kitchili*	C_{10}-*Varappukudainchan*	C_{11}-Co51(Check)	

Table 2: Effect of production packages on yield parameters in traditional rice cultivars

Treatments	**Filled Grains**				**Ill Filled Grains**				**Panicle Length (cm)**			
	P_1	**P_2**	**P_3**	**Mean**	**P_1**	**P_2**	**P_3**	**Mean**	**P_1**	**P_2**	**P_3**	**Mean**
C_1	125.85	114.85	75.40	105.37	14.50	16.50	25.40	18.80	16.84	16.99	15.73	16.52
C_2	71.50	62.45	53.10	62.35	14.90	16.40	26.60	19.30	18.32	17.30	15.64	17.09
C_3	105.80	93.90	75.40	91.70	14.60	15.10	26.40	18.70	21.09	19.61	17.73	19.48
C_4	113.70	104.05	72.80	96.85	14.70	15.90	24.40	18.33	19.92	18.53	16.66	18.37
C_5	115.40	107.95	71.20	98.18	14.30	15.45	22.90	17.55	20.00	18.64	16.09	18.24
C_6	103.70	96.30	72.00	90.67	15.80	17.50	25.00	19.43	20.06	18.79	17.07	18.64
C_7	119.30	113.70	89.50	107.50	15.70	17.40	23.60	18.90	21.08	18.61	18.28	19.32
C_8	122.50	111.20	90.80	108.17	15.10	15.50	21.90	17.50	20.91	19.73	17.65	19.43
C_9	117.70	109.15	90.90	105.92	14.30	14.65	23.10	17.35	18.96	17.54	15.97	17.49
C_{10}	128.10	122.20	90.30	113.53	15.70	16.80	22.70	18.40	21.14	19.63	17.90	19.56
C_{11}	109.10	102.70	84.90	98.90	14.70	15.90	23.60	18.07	20.20	18.55	17.17	18.64
Mean	112.06	103.50	78.75		14.94	16.10	24.15		19.87	18.54	16.90	
	P	C	P x C	C x P	P	C	P x C	C x P	P	C	P x C	C x P
S.Ed	1.96	3.37	4.91	6.18	0.43	0.96	1.32	1.55	0.40	0.64	0.95	1.21
CD(0.05)	8.44	6.89	NS	NS	1.85	NS	NS	NS	1.71	1.30	NS	NS

Treatment Detail

P_1 - Organic production packages (NPOF)		**P_2-TNAU recommended inorganic package of practices**			**P_3-Control**
C_1-*Annamazhagi*	C_2-*Arupatham kuruvai*	C_3-*Chithiraikaar*	C_4-*Kallurundaiyan*	C_5-*Karuthakaar*	C_6-*Ottukitchili*
C_7-*Salem samba*	C_8-*Sigappu kuruvaikaar*	C_9-*Thirunelveli kitchili*	C_{10}-*Varappukudainchan*	C_{11}-Co51(Check)	

Table 3: Effect of production packages on yield in traditional rice cultivars

Treatments	**Grain yield (kg ha^{-1})**				**Straw yield (kg ha^{-1})**			
	P_1	**P_2**	**P_3**	**Mean**	**P_1**	**P_2**	**P_3**	**Mean**
C_1	3520	3030	1585	2712	8925	7315	4995	7078
C_2	2730	2300	1410	2147	7400	6215	4400	6005
C_3	3105	2675	1580	2453	8345	7145	4725	6738
C_4	3315	2705	1700	2573	8415	7275	4635	6775
C_5	3295	2930	1575	2600	8655	7125	5045	6942
C_6	2595	2245	1525	2122	7057	6850	4600	6169
C_7	2805	2395	1715	2305	8185	7555	4515	6752
C_8	2855	2300	1475	2210	8545	7650	4625	6940
C_9	2950	2585	1155	2230	7995	7215	4455	6555
C_{10}	3405	2930	1370	2568	8891	8095	5075	7354
C_{11}	4810	4415	1965	3730	7754	6282.5	3580	5872
Mean	3217	2774	1550		8197	7157	4605	
	P	C	P x C	C x P	P	C	P x C	C x P
S.Ed	73.47	87.33	146.07	202.80	175.60	178.18	322.72	466.06
CD(0.05)	316.1	178.4	291.6	441.9	755.5	363.9	644.3	1015.4

Treatment Detail

P_1 - Organic production packages (NPOF)		P_2-TNAU recommended inorganic package of practices			P_3-Control
C_1-*Annamazhagi*	C_2-*Arupatham kuruvai*	C_3-*Chithiraikaar*	C_4-*Kallurundaiyan*	C_5-*Karuthakaar*	C_6-*Ottukitchili*
C_7-*Salem samba*	C_8-*Sigappu kuruvaikaar*	C_9-*Thirunelveli kitchili*	C_{10}-*Varappukudainchan*	C_{11}-Co51(Check)	

References

1. Ameen A, Ahmad J, Raza S. Effect of compost and gypsum on rice crop production in saline soil. International Journal of Advances in Scientific Research. 2017;3(8):99-100.
2. Chouichom S, Yamao M. Comparing opinions and attitudes of organic and non-organic farmers towards organic rice farming system in northeastern Thailand. Journal of Organic Systems. 2010;5(1):25-35.
3. Devi GN, Padmavathi G, Babu VR, Waghray K. Proximate nutritional evaluation of rice (*Oryza sativa* L.). Journal of Rice Research. 2015;8(1):23–32.
4. Fernando B. Rice as a Source of Fibre. Rice Research. 2013;1(2):2-4.
5. Kennedy G, Burlingame B. Analysis of food composition data on rice from a plant genetic resources perspective. Food Chemistry. 2003;80:589-596.
6. Otung IA. Evaluation of six chinese maize (*Zea mays*) varieties in the humid tropical environment of Calabar, south-east, Nigeria. Global Journal of Agricultural Research. 2014;2(3):10-16.
7. Ramesh S, Keerthana S, Elankavi S, Baradhan G, Kalaiyarasan C and Jawahar S. Production potential of traditional rice (*Oryza sativa*) varieties as influenced by EM compost under Cauvery delta zone of Tamil Nadu. Plant Archives. 2019;19(2):2982-2986.
8. Ranabhat S, Amgain LP. Evaluation of different nutrient management practices in yield of different rice cultivars in Lamjung district of Nepal. International Journal of Applied Sciences and Biotechnology. 2016;4(2):223-227.
9. Sreenivasa MN, Naik N and Bhat N. Nutrient status and microbial load of different organic liquid manures. Karnataka Journal of Agricultural Sciences. 2011;24(4):583-584.
10. Wheeler SA. What influences agricultural professionals views towards organic agriculture? Ecological Economics. 2008;65(1):145-154.