International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(2): 2518-2519

Received: 26-01-2020
Accepted: 28-02-2020

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Performance of paddy varieties in salt affected soil

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DOI: https://doi.org/10.22271/chemi.2020.v8.i2al.9129

Abstract
In Cuddalore district, paddy is the major cereal crop. Some part of Vridhachalam, Parangipettai, Nallur and Mangalore blocks of Cuddalore district soils are affected by saline and sodic soil resulting in low productivity in paddy. In order to enhance the yield in saline and sodic, efforts were taken to identify suitable rice varieties. The present field-oriented research was done under the close supervision of soil scientist of Farm Science Centre through organizing On-Farm Trails (Assessment) at five different locations. The main objective of the study is to evaluate the performance of paddy varieties in salt affected soils of Cuddalore district. The blocks having desired EC, pH and ESP were taken for the assessment of rice varieties. Keeping the parameters mentioned earlier, Parangipettai and Vridhachalam block of Cuddalore district was opted for the study. Uniform cultural practices were applied to all the varieties up to maturity. Proper plant protection measures were taken according to the incidence of pest and diseases. The on-Farm Testing consist of three paddy variety *viz.*, BPT 5204 (Farmer practice), TRY 3 and Gangavathi Sona-05-01 as test varieties were taken for assessment. The results showed that paddy variety TRY 3 recorded maximum yield, yield attributes and net return when compared to Gangavathi sona and farmer's practice. TRY 3 paddy variety registered highest yield of 6.37 t/ha followed by Gangavathi sona 05-01 (5.57 t/ha) and BPT 5204 (5.38 t/ha). TRY 3 recorded 18.40 per cent higher yield over farmer's practice and 14.36 per cent over Gangavathi sona. Net return was recorded maximum of in TRY 3 followed by Gangavathi sona 05-01 and BPT 5204. TRY 3 recorded 32.40 per cent higher net return over farmer's practice and 23.71 per cent over Gangavathi sona. The trial farmers expressed that, TRY 3 performed comparatively better than other two varieties in respect of major diseases like bacterial blight and blast. To conclude, TRY 3 variety can be recommended for salt affected soils based on the study result.

Keywords: Saline soil, sodic soil, paddy varieties, assessment and yield

Introduction
In India, 6.73 m.ha of land affected by salt. Out of which 3.77 m.ha and 2.96 m.ha of land affected by sodic and saline respectively. In Tamil Nadu 3.86 lakh ha of soil is affected by salt. Out of which 0.13 lakh ha and 3.54 lakh ha affected by saline and sodic respectively. Salinity largely reduce the yield of rice in India. Salinity in arable land is mainly caused by the excessive use of irrigation water with improper drainage, poor quality irrigation water containing an excess level of salts, and flooding from seawater (Ismail *et al.*, 2007) [1]. The effective reclamation of these saline soils is difficult and complex due to frequent inundation and tidal flooding. It would therefore, be wise to grow the salt tolerant varieties. Crop vary in their relative tolerance to soil salinity. Selection of crop for their tolerance is thus an important aspect for the management of saline soils. During high soil salinity, the entire area remains fallow. Salt tolerant crops may be an alternative for increasing cropping intensity in these problem soils. Rice is usually considered to be the medium salt tolerant crop as studied elsewhere!. All varieties of rice, however, do not have the same sensitivity to salts. It may not be difficult to find out a salt tolerant variety or even to develop one through breeding, if proper attention is given towards this direction. Salt tolerant variety of rice may be a solution to the adverse situations like localities where salinity is increasing due to the addition of low quality irrigation water. *In view* of the above facts the study was undertaken to find the performance of paddy varieties in saline soil.

Materials and methods

The study was conducted at farmers field of Parangipettai and vridhachalam block in Cuddalore District. Three different paddy varieties were used for this study viz., BPT 5204, Paddy TRY 3 and Gangavathi Sona (05-01). Mostly farmers are used BPT-5204 paddy variety. It is a long duration variety, matures at around 140-150 days. This variety is excellent in grain quality and is a locally preferred variety over the decades. However, the performance of BPT-5204 is reported to be poor when grown under saline conditions since the yield levels decline with increase in soil salinity. Further, in recent years due to its greater susceptibility to pest and diseases, farmers are showing lack of interest for its cultivation. Hence, there is a need to evaluate the performance of some of the salt tolerant varieties. The paddy varieties like TRY 3 and Gangavathi Sona (05-01) are saline tolertent. The duration of TRY 3 paddy variety is 120-135 days and medium bold grain. The duration of Gangavathi Sona (05-01) is 135 – 140 days and medium slender grain. The soil of the experimental field was clay loam in texture with low in organic carbon content, pH and EC of soils were 8.45 - 8.65 and 2.01-2.63 dS m^{-1} respectively. The fertility level falls under low in available nitrogen, and medium in available phosphorus and potassium. Green manure daincha grown and incorporated at 50% flowering stage. Each of the *Azospirillum* and *Phosphobacteria* @ 2 kg ha^{-1} were mixed with 25 kg FYM and 25 kg of soil and broadcast the mixture uniformly in the main field before transplanting. Fertilizers were applied based on soil testing. Full dose of P was applied as basal and incorporated.in the soil and 25% of N and K applied as basal, remaining dose of nitrogen was applied in three splits of 25% at tillering stage, 25% at panicle initiation stage and 25% at heading stage. Soil application of TNAU Micro Nutrient mixture @ 12.5 kg ha^{-1} at basal stage was done. Uniform cultural practices were applied to all the varieties up to maturity. Proper plant protection measures were taken according to the incidence of pest and diseases. The observations made on number of tillers per hill, number of grains per panicle and grain yield.

Result and discussion

The results showed that paddy variety TRY 3 recorded maximum yield, yield attributes and net return when compared to Gangavathi sona and BPT 5204 (Table 1). TRY 3 paddy variety registered highest yield of 6.37 t/ha followed by Gangavathi sona 05-01 (5.57 t/ha) and BPT 5204 (5.38 t/ha). TRY 3 recorded 18.40 per cent higher yield over farmer's practice and 14.36 per cent over Gangavathi sona. Similar results were also observed by Purnendu *et al.* (2004) [3] and Panda *et al.* (2009) [2]. The paddy variety TRY 3 recorded higher number of productive tillers (25.7) and number of grains per panicle (139.9 panicles) when compared to Gangavathi sona 05-01 and BPT 5204. Santosh *et al*. (2019) [4] also obtained similar findings.

Economic indicator indicated that the net return was recorded maximum of in TRY 3 followed by Gangavathi sona 05-01 and BPT 5204. TRY 3 recorded 32.40 per cent higher net return over farmer's practice and 23.71 per cent over Gangavathi sona.

Table 1: Yield, yield attributes and economics of paddy varieties

Paddy variety	No. of productive tillers per hill	No. of grains per panicle	Yield (t/ha)	Net Returns (Rs.)	B:C ratio
BPT 5204	17.2	118.5	5.38	29229	2.19
TRY 3	25.7	139.9	6.37	38702	2.61
Gangavathi Sona (GGV-05-01)	16.2	125.8	5.57	31284	2.28

Conclusion

Overall, the performance of TRY 3 in terms of grain yield and yield attributes under saline soil was better than the BPT-5204 which is a highly preferred rice variety of the region and Gangavathi Sona (GGV-05-01). TRY 3 performed comparatively better than other two varieties in respect of major diseases like bacterial blight and blast

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