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Effect of Organic Nutrition on Quality Characters of Chinese Potato (*Plectranthus rotundifolius*)

Chinese potato (*Plectranthus rotundifolius*) is a tuber crop, and the tubers are used as vegetables. It has an aromatic flavour and delicious taste on cooking. These tubers are rich in minerals like calcium, iron and certain vitamins including thiamine, riboflavin, niacin and ascorbic acid. Being a component of export market of vegetables to the Middle East countries, organic production of chinese potato assumes importance. Hence it has been necessitated to study the effect of organic nutrition on tuber yield and quality characters of two varieties of chinese potato.

The treatments consisted of factorial combinations of three levels of organic manures viz. 100, 75 and 50 per cent recommended dose (RD) of 60:60:100 kg NPK ha^{-1} (KAU, 2007), two levels of biofertilizers, viz. PGPR mix 1 and without biofertilizer and two varieties viz. Sree Dhara and Suphala. Sree Dhara is a high yielding variety of chinese potato released from ICAR- CTCRI, Thiruvananthapuram. Suphala is a high yielding photo-insensitive variety, released from KAU, Vellanikkara, which is adaptable for year round cultivation. Half the dose of organic manure was applied as farmyard manure and half the dose as coir pith compost. The doses of farmyard manure and coir pith compost were fixed on N equivalent basis and additional requirement of K was supplied through wood ash. The organic manures were analysed for nutrient contents and it was observed that FYM contained 0.5 % N, 0.32 % P_2O_5 and 0.2 % K_2O, coir pith compost contained 1 % N, 0.12 % P_2O_5 and 1 % K_2O and wood ash contained 0.52 % N, 1.04 % P_2O_5 and 2.2 % K_2O. The quantities of organic manures applied in the present study are shown inTable 1. Neem cake at the rate of 1 t ha^{-1} was applied uniformly to all the plots as a prophylactic measure against nematodes.

The experiment was laid out in 3 x 2 x 2 asymmetrical factorial RBD with three replications at College of Agriculture, Vellayani during August to December, 2011. The soil of the experimental site was sandy clay loam in texture with a pH of 5.8. It was high in organic carbon (1.46 %), low in available nitrogen (188.16 kg ha^{-1} N), high in available phosphorus (48.16 kg ha^{-1} P), and medium in available potassium (125.89 kg ha^{-1} K).

Starch content of tuber was estimated by using potassium ferricyanide method (Ward and Pigman, 1970). The values were expressed as percentage on dry weight basis. Protein content of the tuber on dry weight basis was calculated by multiplying percentage of N in the tuber with the factor 6.25 (Simpson *et al*., 1965). Samples of the tubers weighing 100 g each was taken from all the treatments and were arranged over newspaper spread on floor under ambient conditions and observed for shelf life of the tubers. Every day the tubers were observed for sprouting and decay. The weight of samples were recorded once in 3 days to calculate the physiological loss in weight (PLW) using the formula as given below.

$$PLW\,(\%) = \frac{\text{Initial weight - Final weight}}{\text{Initial weight}} X\,100$$

The results of quality characters of the tuber in terms of starch and protein contents (Table 2) revealed no significant difference in starch and protein contents of the tuber due to different levels of organic manure, biofertilizer and varieties. However, the starch and protein content increased with increase in the levels of organic manure and also due to biofertilizer application, but the effect was non significant. The variety Sree Dhara recorded higher starch (72.45 %) and protein content (7.58 %) on dry weight basis than the variety Suphala (70.69 % and 6.81 % respectively).

Shelf life of tubers was also studied by observing sprouting, microbial decay and physiological loss in weight of tubers. It was found that sprouting started after one month of storage and was completed in all the tubers of all the treatments by the end of 2 months of storage. Archana (2001) reported 50 percentage sprouting of tubers in the stored samples of Chinese potato within 30-40 days of

Table 1. Quantities of organic manures applied as per treatments

Treatments	Quantities of organic manures applied per ha
100% RD	6 t FYM + 3 t coir pith compost + 3 t wood ash
75% RD	4.5 t FYM + 2.25 t coir pith compost + 2.25 t wood ash
50% RD	3 t FYM + 1.5 t coir pith compost + 1.5 t wood ash

storage irrespective of the treatments. But no decay of tubers was observed due to microbial attack even when the tubers were stored for more than 2 months which is in agreement with the findings of Archana (2001).

It can be seen from Table 2 that physiological loss in weight (PLW) of tubers at the end of 1 month of storage was significantly influenced by the levels of organic manure, biofertilizer and varieties. The PLW increased with the increase in the levels of organic manure with the highest loss (14.83%) recorded by m_1(100% RD) and the lowest (9.54%) by m_3(50% RD) level. Higher PLW was observed due to biofertilizer application. The variety Suphala showed significantly lower PLW (8.69%) than the variety Sree Dhara (15.47%). None of the interactions were found significant.

At the end of two months of storage, varieties alone showed significant variation in PLW (Table 2) and the var. Suphala registered a lower value of 14.03 per cent. The interaction B x V (Table 3) produced significant effects on PLW of tubers. Higher PLW was recorded by the var. Sree Dhara with and without PGPR mix 1 (b_1v_1 and b_2v_1), which were on par at both stages of observation. In the case of var. Suphala, at the end of 1 month of storage, the application of PGPR mix 1 (b_1v_2) produced significant effect than without biofertilizer (b_2v_2). After two months of storage the effects of b_1v_2 and b_2v_2 were found to be on par.

Table 2. Effect of levels of organic manure, biofertilizer and varieties on tuber yield and quality characters of Chinese potato

Treatment	Tuber yield (t ha^{-1})	Starch (%)	Protein (%)	PLW % after 1 month of storage	PLW % after 2 months of storage
Levels of organic manure					
m_1 (100% RD)	23.49	71.89	7.58	14.83	19.00
m_2 (75% RD)	22.42	71.81	7.44	11.88	17.38
m_3 (50% RD)	19.88	71.00	6.56	9.54	16.63
CD (0.05)	0.979	NS	NS	1.892	NS
Biofertilizer					
b_1 (With PGPR mix 1)	23.07	71.78	7.29	13.14	17.86
b_2 (Without PGPR mix 1)	20.78	71.35	7.10	11.03	17.47
CD (0.05)	0.799	NS	NS	1.545	NS
Varieties					
v_1 (Sree Dhara)	22.86	72.45	7.58	15.47	21.31
v_2 (Suphala)	20.99	70.69	6.81	8.69	14.03
CD (0.05)	0.799	NS	NS	1.545	2.074

NS – Non significant

Table 3. Interaction effect of levels of organic manure, biofertilizer and varieties on physiological loss in weight of Chinese potato tubers during storage.

Treatments	PLW % after 1 month of storage	PLW % after 2 months of storage
m_1b_1	16.83	19.75
m_1b_2	12.83	18.25
m_2b_1	12.33	17.33
m_2b_2	11.42	17.42
m_3b_1	10.25	16.50
m_3b_2	8.83	16.75
CD	NS	NS
m_1v_1	19.58	23.17
m_1v_2	10.08	14.83
m_2v_1	14.75	20.08
m_2v_2	9.00	14.67
m_3v_1	12.08	20.67
m_3v_2	7.00	12.58
CD	NS	NS
b_1v_1	15.22	20.39
b_1v_2	11.06	15.33
b_2v_1	15.72	22.22
b_2v_2	6.33	12.86
CD	2.185	2.933

NS – Non significant

Even after 2 months of storage, there was no conspicuous physiological loss in weight (Table 2). At the end of 1 month and 2 months of storage the variety Suphala recorded lower values of PLW than the variety Sree Dhara with all treatments indicating better storability of tubers of the variety Suphala.

The results indicated no significant difference in quality characters of tuber such as starch and protein contents due to treatments. So the dose of organic manure can be standardized for getting higher yields of chinese potato without change in quality of the tuber. The tubers could be stored for one month without sprouting, microbial decay and appreciable physiological loss in weight.

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