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RESEARCH ARTICLE

Evaluation of chinese potato (*Plectranthus rotundifolius*) germplasms under coconut-based cropping system in Tamil Nadu

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Abstract

Coconut (*Cocos nucifera* L.), a key plantation crop in India, contributes significantly to the national economy. Despite high productivity, coconut farmers face challenges including fragmented landholdings and biotic stress, necessitating the adoption of intercropping systems to improve land use efficiency and profitability. Intercropping shade-tolerant tuber crops like Chinese potato (*Plectranthus rotundifolius*), particularly in the underutilized interspaces of coconut plantations, offers multiple agronomic and economic benefits. An experiment was conducted during the 2024-25 kharif season in Theni district, Tamil Nadu, to evaluate the performance of 40 Chinese potato germplasms under an 8-year-old coconut plantation. The study followed a randomized block design with three replications. Data on growth and yield parameters such as number of branches, days to flowering, tuber dimensions, tuber count and fresh tuber weight were recorded and statistically analyzed. Germplasm PKM-CP-2 exhibited superior performance in tuber length, width, number and yield (333.8 g plant^{-1}), followed by PKM-CP-10, PKM-CP-4 and PKM-CP-8. In contrast, PKM-CP-23 consistently showed the lowest performance across several traits. The results suggest substantial genotypic variation among germplasms, with certain accessions demonstrating promising yield potential for intercropping systems. The study highlights the viability of integrating Chinese potato as a high-value secondary crop in coconut plantations, providing enhanced income opportunities for smallholder farmers and optimizing resource utilization. Further exploration of high-performing germplasms could support commercialization and diversification in coconut-based farming systems.

Keywords: chinese potato; coconut-based intercropping; germplasm evaluation; smallholder income diversification; tuber yield performance

Introduction

Coconut (*Cocos nucifera* L.), a significant plantation crop in India, is a member of the Palmae family. It plays a crucial role in India's economy, providing around ₹15000 crore to the GDP. India contributes for roughly 72 % of the global coconut production, achieving extraordinary productivity levels. An estimated 15064 metric tonnes nuts are produced annually from cultivation on 21.97 million hectares, with an average productivity of 9815 nuts per hectare according to 2024-25 first advance estimates data (1). However, coconut growers confront various obstacles, including fragmented landholdings, variable input costs, price decreases and severe insect and disease infestations (2). It is imperative to increase coconut production through better management techniques to guarantee profitability.

Coconut plantations (up to 8 years of planting and after 20 years of age) provide great opportunities for intercropping and consequently, for making the best use of the land resources that are available. According to studies, coconut trees only occupy 28 % of the land (3) and over 80 % of the root activity was restricted to a 2-meter lateral distance from the stem (4). Therefore, it would be profitable to cultivate other crops on the remaining acreage. The palms' orientation and venetian leaf structure allow light to enter the interstitial spaces. Intercropping tropical tuber crops such as cassava, yams, edible aroids and sweet potatoes with perennial plantation and fruit crops including coconut, arecanut, rubber, coffee and banana is a common practice in humid tropical regions (5). Among these, cassava, yams, coleus and edible aroids are the most favoured intercrops in coconut plantations in South India (6). This intercropping system offers several advantages, including generating income from the primary crop, enhancing food security through tuberous crops, reducing risks from natural disasters, improving resource utilization, increasing net earnings and creating employment opportunities (7).

Chinese potato (*Plectranthus rotundifolius*), a widely grown tuber crop in tropical regions, originally traces its roots to Central or Eastern Africa. Over time, it has spread across tropical areas worldwide, becoming a common staple in many countries (8, 9). Being known by multiple names in different African and Asian countries makes it very difficult to compile reliable data and organize the corpus of current research on Chinese potato. Other names for it include "country potato," "Chinese potato," "hausa potato," or "coleus potato" in English, "koorka" in Hindi and "sirukizhanku" in Tamil (10). *P. rotundifolius* is grown on a modest scale in southern Indian states like Tamil Nadu, Kerala and Karnataka (11). In Tamil Nadu, it is cultivated in Tirunelveli, Thoothukudi, Tenkasi and Theni districts only.

Chinese potato tubers are eaten fried, roasted, or curried (12). They are rich in vital vitamins and calories. Raw tubers have an energy content of 395.18 kcal/100g, consist of 2.22 % protein and 95.45 % carbohydrates (13). High concentrations of magnesium (811.52 mg/100g), calcium (716.59 mg/100g) and potassium (73.33 mg/100g) are found in the tubers' pulp (14). The crop's agronomic benefits on poor soils and better yield with lower production inputs than other tuber crops make it extremely desirable. However, it has a lot of potential for commercialization and is usually farmed as a subsistence crop (10, 15). As a high-value cash crop for both domestic and international markets, Chinese potatoes have good potential for income generation (16). The crop offers small farmers better financial returns on investment because it sells for a comparatively higher price than sweet potatoes, cassava and ordinary potatoes (8). So, the remaining area under the coconut plantation could be profitably used for the interspaces to produce a variety of shade-tolerant crops, such as sweet potatoes and Chinese potato (Coleus) as secondary crops (17). In view of the, during the 2024 kharif season, an experiment utilizing various Chinese potato germplasms was carried out under a 7-year-old coconut plantation in cooperation with Horticultural College and Research Institute, Tamil Nadu Agricultural University, Periyakulam, Tamil Nadu and ICAR-Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala.

Materials and Methods

The experiment was conducted during 2024-25 in an 8 year old coconut plantation in a farmer's garden at Theni district of Tamil Nadu for studying the performance of different Chinese potato germplasms under coconut based cropping system in Tamil Nadu. The coconut palms were planted at a spacing of 6.5 m × 6.5 m. The experimental site is located at a latitude of 10.1258° North, Longitude of 77.5648° East and an altitude of 296 meters above mean sea level. The climate of the site is slightly subtropical. The mean rainfall, relative humidity, maximum and minimum temperature during the growing seasons were 833.5 mm, 67.83 % and 36.2 °C and 23.6 °C respectively. The experimental plots in between coconut palms were ploughed thoroughly with a power tiller in the second fortnight of June, during 2024. The soil was deeply ploughed twice to a depth of 20-25 cm. Immediately afterward, ploughing was followed using a Desiplough and plankings. This process helped pulverize and level the soil, thereby improving moisture conservation. The surface was levelled with a spade and ridges and furrows (15 cm height and 30 cm distance), irrigation channels were made around the plots. The corners of the plots were prepared by the spade. The layouts of the experiment were prepared according to the design of experiment. FYM @ 10 t ha^{-1} along with recommended doses of fertilizer for Chinese potato (N:P:K- 80:60:80 Kg ha^{-1}) were applied in two splits doses. Half dose of N, full dose of P_2O_5 and half dose of K_2O were applied as basal dose during land preparation and rest of the quantity were applied at 45 days after planting as top dressing followed by earthing up. Healthy and disease-free terminal cutting of Chinese potato (15-20 cm) was taken as planting materials. Forty Chinese potato germplasms (Table 1) *viz.,* PKM-CP-1, PKM-CP-2, PKM-CP-3, PKM-CP-4, PKM-CP-5, PKM-CP-6, PKM-CP-7, PKM-CP-8, PKM-CP-9, PKM-CP-10, PKM-CP-11, PKM-CP-12, PKM-CP-13, PKM-CP-14, PKM-CP-15, PKM-CP-16, PKM-CP-17, PKM-CP-18, PKM-CP-19, PKM-CP-20, PKM-CP-21, PKM-CP-22, PKM-CP-23, Sreedhara, Nidhi, PKM-CP-24, PKM-CP-25, PKM-CP-26, PKM-CP-27, PKM-CP-28, PKM-CP-29, PKM-CP-30, PKM-CP-31, PKM-CP-32, PKM-CP-33, PKM-CP-34, PKM-CP-35, PKM-CP-36, PKM-CP-37 and PKM-CP-38 were laid out in randomized block design with three replications. 30 number of Chinese potato plants were planted at a spacing of 60 cm × 30 cm in 2 m × 2 m plot during first fortnight of July 2024. Watering is done immediately after planting of cutting. Afterward each plot was irrigated at 10 days interval to keep the field soil nearly at field capacity. Excess water was drained as and when required to prevent waterlogging. The experimental plots were kept weed free by hand weeding twice at 30 days 60 days and 90 days after planting. Five plants from each plot were selected randomly for recording of the data like plant vigour, stem thickness (cm), number of primary branches, number of secondary branches, days to flowering, largest tuber length (cm), largest tuber width (cm), medium tuber length (cm), medium tuber width (cm), smallest tuber length (cm), smallest tuber width (cm), number of largest tubers plant $^{-1}$, number of medium tubers plant $^{-1}$, number of smallest tubers plant $^{-1}$, largest tuber weight (g), medium tuber weight (g), smallest tuber weight (g), total yield plant^{-1}. Statistical analysis was carried out on each biometrical trait recorded in the study using SPSS

Table 1. List of Chinese potato (*Plectranthus rotundifolius*) genotypes used in the study

S.No	Accession number	Genotype name	Source of the genotypes
1	PKM-CP-1	Tirunelveli	Tirunelveli district
2	PKM-CP-2	Mannarkoil	Tirunelveli district
3	PKM-CP-3	Arasakulam	Tirunelveli district
4	PKM-CP-4	Pallakkal	Tirunelveli district
5	PKM-CP-5	Kadayam	Tenkasi district
6	PKM-CP-6	Paraikulam	Tirunelveli district
7	PKM-CP-7	V.M.Chatram	Tirunelveli district
8	PKM-CP-8	Mukkoodal	Tirunelveli district
9	PKM-CP-9	Ambai	Tirunelveli district
10	PKM-CP-10	Pavoorchatram	Tenkasi district
11	PKM-CP-11	Pabanasam	Tirunelveli district
12	PKM-CP-12	Kilapavoor	Tenkasi district
13	PKM-CP-13	Kanthaloor	Idukki district
14	PKM-CP-14	Maraiyoor	Idukki district
15	PKM-CP-15	Vattavada	Idukki district
16	PKM-CP-16	Devikulam	Idukki district
17	PKM-CP-17	Kattapana	Idukki district
18	PKM-CP-18	Idukki local	Idukki district
19	PKM-CP-19	Alathur	Palakkad district
20	PKM-CP-20	Vythiri local	Wayanad district
21	PKM-CP-21	Kalpetta	Wayanad district
22	PKM-CP-22	Kalavadi	Ernakulam district
23	PKM-CP-23	Manakkad	Idukki district
24	Sreedhara	Sreedhara	CTCRI, Thiruvananthapuram
25	Nidhi	Nidhi	RARS, KAU, Pattambi
26	PKM-CP-24	Ettayapuram	Thoothukudi district
27	PKM-CP-25	Cumbum	Theni district
28	PKM-CP-26	Tenkasi	Tenkasi district
29	PKM-CP-27	Kullaprachil	Idukki district
30	PKM-CP-28	Kunumkulam	Thrissur district
31	PKM-CP-29	Varavoor	Thrissur district
32	PKM-CP-30	Vadenmedu	Idukki district
33	PKM-CP-31	Perumpavoor	Ernakulam district
34	PKM-CP-32	Palakad	Palakkad district
35	PKM-CP-33	Mysore	Mysuru district
36	PKM-CP-34	Thodupuzha	Idukki district
37	PKM-CP-35	Kovilpatti	Thoothukudi district
38	PKM-CP-36	Wayanad	Wayanad district
39	PKM-CP-37	Kayatharu	Thoothukudi district
40	PKM-CP-38	Idaikal	Tenkasi district

version 20.0, STAR version 2.0, XLSTAT and TNAUSTAT packages. The significance of different sources of variation was tested using Fisher and Snedecor's 'F' test at the 0.05 probability level. Least significant differences (LSD) among factor levels and their interaction effects were calculated using appropriate formulas (18), with reference to the statistical tables provided by Fisher and Yates (19).

Results and Discussion

Growth parameters

Number of primary branches and secondary branches

The data presented in Table 2 on the number of primary and secondary branches of 40 Chinese potato germplasms at 60, 90 and 120 days after planting (DAP) indicated that the germplasm PKM-CP-13 recorded the highest mean number of primary branches (10) at 60 DAP, while PKM-CP-25 recorded the lowest (3) during the same period. Similarly, at 90 DAP, maximum number of primary branches (15) was recorded in the germplasm PKM-CP-13 followed by PKM-CP-2 (14.5) and PKM-CP-20 (14.5) which were on par with each other. However, PKM-CP-25 recorded minimum number of primary branches (5.5). At 120 DAP, maximum number of primary branches (17) was noted in the germplasm PKM-CP-13 and PKM-CP-23 and PKM-CP-10 registered minimum of 8 numbers. Mean data analysis also revealed that number of secondary branches of Chinese potato developed within the period of 60 to 120 days was restricted in between 2 to 7.5 numbers per plant. At 60 DAP, out of 40 germplasms, maximum 4 number of branches were recorded in the germplasm PKM-CP-5 and PKM-CP-33 followed by PKM-CP-13 (3.5 numbers) and germplasm PKM-CP-29 recorded minimum of 2 numbers. At 90 DAP, maximum 6 number of secondary branches were noted in the germplasm PKM-CP-20 followed by PKM-CP-2 (14.5 numbers) and PKM-CP-13 (14.5 numbers) while, PKM-CP-7 recorded minimum of 3 numbers. At 120 DAP, the number of secondary branches was highest in PKM-CP-13 and PKM-CP-20 (7.5 each), while the lowest (4) was recorded in the germplasms PKM-CP-7 and PKM-CP-25. An earlier study also reported variations in the mean number of branches per plant in sweet potato and noted that the number of branches produced by a plant is primarily a genetic character and that it is influenced by Indole Acetic Acid (IAA) in the plant as well as prevailing environmental conditions (20). The number of branches contributes to the total dry matter produced by the plant, which in turn may lead to higher tuber yield.

Table 2. Mean performance of Chinese potato (*Plectranthus rotundifolius*) genotypes for growth characters

S.No	Treatment	Number of primary branches	Number of secondary branches	Days to flowering	Matured stem height (cm)
1	PKM-CP-1	11.0	5.0	97.50	70.00
2	PKM-CP-2	15.5	7.0	83.50	81.00
3	PKM-CP-3	10.0	5.0	100.50	63.50
4	PKM-CP-4	15.0	7.0	79.50	79.50
5	PKM-CP-5	15.0	6.0	85.50	77.50
6	PKM-CP-6	9.0	5.0	107.50	66.50
7	PKM-CP-7	8.0	4.0	106.00	56.00
8	PKM-CP-8	10.0	4.5	103.00	66.50
9	PKM-CP-9	9.0	4.5	108.00	64.00
10	PKM-CP-10	8.0	5.5	104.50	61.50
11	PKM-CP-11	10.0	5.0	103.00	67.50
12	PKM-CP-12	9.0	5.0	104.00	73.50
13	PKM-CP-13	17.0	7.5	77.00	75.50
14	PKM-CP-14	11.0	5.0	97.50	69.50
15	PKM-CP-15	11.0	5.0	99.00	69.50
16	PKM-CP-16	14.0	6.0	91.00	73.00
17	PKM-CP-17	9.0	5.0	101.00	63.00
18	PKM-CP-18	9.0	4.5	114.00	64.50
19	PKM-CP-19	15.0	7.0	86.50	78.50
20	PKM-CP-20	16.5	7.5	78.00	80.50
21	PKM-CP-21	10.5	5.0	99.50	64.00
22	PKM-CP-22	8.0	4.5	111.50	65.00
23	PKM-CP-23	8.0	4.0	107.50	60.00
24	Sreedhara	14.5	6.0	90.00	74.00
25	Nidhi	14.0	6.0	91.50	77.00
26	PKM-CP-24	11.0	5.5	96.00	70.50
27	PKM-CP-25	8.0	4.0	105.00	58.50
28	PKM-CP-26	15.5	7.0	81.50	82.50
29	PKM-CP-27	15.5	7.0	81.50	79.50
30	PKM-CP-28	13.0	5.5	95.50	72.00
31	PKM-CP-29	13.0	6.0	93.00	71.50
32	PKM-CP-30	10.5	6.0	93.50	74.00
33	PKM-CP-31	14.5	6.5	88.50	76.00
34	PKM-CP-32	12.5	5.5	95.00	70.00
35	PKM-CP-33	15.0	6.5	88.50	76.00
36	PKM-CP-34	11.5	5.0	99.50	69.00
37	PKM-CP-35	10.0	5.0	106.00	67.00
38	PKM-CP-36	10.0	4.5	103.50	66.50
39	PKM-CP-37	12.5	6.0	93.00	70.00
40	PKM-CP-38	11.0	5.0	97.00	66.50
	SE (d)	**0.664**	**0.443**	**1.761**	**3.200**
	CD (0.05)	**1.343**	**0.898**	**3.562**	**6.674**

Days to flowering and matured stem height

The data presented in Table 2 on days to flowering of Chinese potato ranging from 78 days to 114 days after planting. The highest number of days to flowering was observed in the germplasm PKM-CP-18 (114.00 DAP), which was followed by the germplasm PKM-CP-22 (111.50 DAP). The lowest number of days to flowering (77 DAP) was observed in the germplasm PKM-CP-13. The differences in the number of days to flowering indicates that this trait is genotypically controlled (21).

The data presented in Table 2 on matured stem height of 40 Chinese potato germplasms at 90 days after planting indicate that germplasm PKM-CP-26 recorded maximum mean matured stem height of 82.50 cm, which was followed by the germplasm PKM-CP-2 (81 cm). The lowest stem height (56.00 cm) was observed in PKM-CP-7 during the same period. Morphometric variation among three morphotypes of *S. rotundifolius* was assessed using twenty-four traits related to canopy growth, crop duration, tuber dimensions and yield. Previous studies have employed characteristics such as plant height, branch length, leaf size, internode spacing, tuber count, tuber weight, tuber length and diameter to compare *Plectranthus esculentus* and *S. rotundifolius*, revealing notable interspecific differences (22).

Yield parameters

Number, length, width and weight of tubers

Data presented in Table 3 on different yield parameters of Chinese potato indicated that, at harvest, the maximum number of large, medium and small tubers (6.5, 9.0 and 20.0 respectively) were recorded in the germplasm PKM-CP-2, Sreedhara and PKM-CP-2 respectively. These were followed by PKM-CP-33 (6.0), PKM-CP-4 (8.5), PKM-CP-10 (18.0) number of large, medium and small tubers respectively and germplasm PKM-CP-28, PKM-CP-11, PKM-CP-23 recorded minimum (2.0, 4.0 and 10.5) number of large, medium and small tubers respectively.

Maximum mean largest tuber length of 5.8 cm was recorded in the germplasm PKM-CP-2 whereas, PKM-CP-23 recorded mean minimum largest tuber length of 3.6 cm. In case of maximum medium tuber length of 3.5 cm recorded from the germplasm PKM-CP-2, PKM-CP-10 and PKM-CP-33, whereas, PKM-CP-23, PKM-CP-28 registered minimum medium tuber length of 2.5 cm. In case of mean smallest tuber, germplasms PKM-CP-2, PKM-CP-10 and PKM-CP-4 recorded maximum smallest tuber length of 2.5 cm followed by germplasm PKM-CP-33 and PKM-CP-24 (2.4 cm). However, PKM-CP-23 (0.8 cm) recorded minimum.

Table 3. Mean performance of Chinese potato (*Plectranthus rotundifolius*) genotypes for tuber characters

S.No	Treatment	Small tubers			Medium tubers			Large tubers		
		Number	Length (cm)	Width (cm)	Number	Length (cm)	Width (cm)	Number	Length (cm)	Width (cm)
1	PKM-CP-1	16.5	2.3	1.7	7.0	3.3	2.9	5.5	5.2	4.3
2	PKM-CP-2	20.0	2.5	1.9	7.5	3.5	3.1	6.5	5.8	4.5
3	PKM-CP-3	15.5	2.2	1.8	7.0	3.2	2.8	4.5	5.1	4.3
4	PKM-CP-4	17.0	2.5	1.9	8.5	3.4	3.0	5.5	5.6	4.5
5	PKM-CP-5	16.5	2.2	1.6	7.0	3.3	3.0	5.0	5.2	4.4
6	PKM-CP-6	12.5	2.2	1.4	6.0	3.0	2.4	3.0	4.6	3.9
7	PKM-CP-7	15.0	2.2	1.7	7.5	3.2	2.8	5.0	5.1	4.3
8	PKM-CP-8	17.5	2.3	1.8	8.5	3.5	3.0	5.5	5.6	4.5
9	PKM-CP-9	12.5	1.7	1.3	6.0	3.1	2.4	3.5	4.5	3.9
10	PKM-CP-10	18.0	2.5	1.9	8.5	3.5	3.1	5.5	5.6	4.5
11	PKM-CP-11	12.5	1.4	0.9	4.0	2.7	2.2	3.0	4.1	3.7
12	PKM-CP-12	15.0	1.9	1.7	7.0	3.2	2.6	4.0	4.7	4.2
13	PKM-CP-13	13.5	1.8	1.5	6.0	3.1	2.5	4.5	4.6	4.1
14	PKM-CP-14	13.5	1.8	1.5	6.0	3.1	2.5	4.5	4.7	4.1
15	PKM-CP-15	13.5	1.7	1.5	6.0	3.1	2.5	4.0	4.7	4.0
16	PKM-CP-16	15.0	2.1	1.7	7.5	3.2	2.8	4.5	4.9	4.2
17	PKM-CP-17	12.0	1.4	1.0	4.5	2.8	2.2	3.0	4.2	3.7
18	PKM-CP-18	15.5	2.1	1.6	7.5	3.2	2.7	4.5	4.8	4.2
19	PKM-CP-19	12.5	1.3	0.8	4.5	2.7	2.2	3.0	4.0	3.6
20	PKM-CP-20	14.0	1.9	1.5	6.5	3.1	2.6	4.0	4.7	4.1
21	PKM-CP-21	13.0	1.5	1.2	5.5	2.9	2.3	3.0	4.5	3.8
22	PKM-CP-22	10.5	1.1	0.7	4.5	2.6	2.1	2.5	3.7	3.4
23	PKM-CP-23	10.5	0.8	0.6	4.5	2.5	1.9	2.5	3.6	3.0
24	Sreedhara	16.0	2.2	1.7	9.0	3.4	3.0	6.5	5.3	4.4
25	Nidhi	15.5	2.2	1.7	8.0	3.2	2.8	4.5	5.1	4.3
26	PKM-CP-24	16.0	2.4	1.8	8.5	3.4	3.0	5.5	5.5	4.4
27	PKM-CP-25	11.5	1.4	1.2	5.0	2.7	2.2	3.0	4.3	3.7
28	PKM-CP-26	15.5	2.3	1.7	8.0	3.4	3.0	5.5	5.4	4.4
29	PKM-CP-27	11.5	1.5	1.1	5.0	2.8	2.3	3.0	4.4	3.7
30	PKM-CP-28	10.5	0.9	0.7	4.0	2.5	2.0	2.0	3.7	3.1
31	PKM-CP-29	11.0	0.9	0.7	4.0	2.6	2.0	2.0	3.7	3.2
32	PKM-CP-30	15.0	2.0	1.6	7.5	3.2	2.8	4.0	4.8	4.2
33	PKM-CP-31	12.5	1.6	1.1	5.0	2.9	2.3	2.5	4.4	3.8
34	PKM-CP-32	14.5	2.0	1.5	7.5	3.2	2.6	4.0	4.7	4.2
35	PKM-CP-33	15.5	2.4	1.7	7.5	3.5	3.0	6.e0	5.4	4.4
36	PKM-CP-34	13.5	1.8	1.4	6.0	3.1	2.5	3.5	4.6	4.0
37	PKM-CP-35	13.0	1.7	1.2	6.0	2.9	2.4	3.0	4.5	3.9
38	PKM-CP-36	15.5	2.1	1.6	7.0	3.3	2.7	4.0	4.7	4.2
39	PKM-CP-37	11.0	1.2	0.8	4.0	2.5	2.1	2.0	3.8	3.6
40	PKM-CP-38	13.5	1.6	1.2	6.0	3.1	2.3	3.0	4.6	3.8
	SE (d)	**0.4789**	**0.0877**	**0.0525**	**0.3279**	**0.0377**	**0.0480**	**0.1027**	**0.0363**	**0.0356**
	CD (0.05)	**1.3613**	**0.2493**	**0.1491**	**0.9321**	**0.1070**	**0.1366**	**0.2921**	**0.1031**	**0.1011**

Maximum mean largest tuber width of 4.5 cm was recorded in the germplasm PKM-CP-2, PKM-CP-10 and PKM-CP-4 whereas, PKM-CP-23 recorded mean minimum largest tuber width of 3.1 cm. In case of maximum medium tuber width of 3.0 cm recorded from the germplasm PKM-CP-2 and PKM-CP-10, whereas PKM-CP-2, PKM-CP-28 and PKM-CP-29 registered minimum medium tuber width of 2.0 cm. In case of mean smallest tuber, germplasms PKM-CP-2, PKM-CP-10 and PKM-CP-4 recorded maximum smallest tuber width of 1.9 cm followed by germplasm PKM-CP-3, PKM-CP-8 and PKM-CP-24 (1.8 cm). However, PKM-CP-23 (0.6 cm) recorded minimum. Tuber length and girth varied in all accessions. Research indicate that variations in tuber length and girth were due to tuber size and the genetic make-up of the plant (23). An earlier study stated that selection based on tuber length is highly desirable for improving sweet potato yield and the same may also apply to Hausa potato (20).

Mean fresh tuber weight and yield plant^{-1}

The maximum mean largest tuber weight of 20.2 g was observed in the accession PKM-CP-2, followed by germplasm PKM-CP-4 (18.4), PKM-CP-8 (16.9) and PKM-CP-10 (16.5). The minimum mean tuber largest weight was observed in the accession PKM-CP-23 (11.0 g). In case of maximum mean medium tuber weight of 11.1 g was observed in the variety Sreedhara, followed by weight of 10.9 g recorded from the variety Nidhi and germplasm PKM-CP-24. The minimum mean medium tuber weight was observed in the accession PKM-CP-28 (6.9 g). For the smallest tubers, the germplasm PKM-CP-2 recorded the maximum mean smallest tuber weight of 6.7 g followed by germplasm PKM-CP-10 (6.5 g), PKM-CP-4 (6.3 g), PKM-CP-8 (6.3 g), PKM-CP-24 (6.3 g) and PKM-CP-35(6.3 g). However, PKM-CP-23 (1.7 g) recorded minimum (Table 4).

The data presented in Table 4 on different yield parameters of Chinese potato like fresh tuber weight plant^{-1}indicated that, at harvest, maximum mean fresh tuber weight of 333.8 g plant^{-1} was found in the germplasm PKM-CP-2, followed by PKM-CP-10 (319.3 g), PKM-CP-4 (316.3 g), PKM-CP-8 (311.8 g) and germplasm PKM-CP-23 recorded minimum fresh tuber weight of 138.7g plant^{-1}. The efficiency of the crop in converting photosynthates into economically valuable products is represented by the large number of tubers produced per plant, which are small in size due to the slow rate of assimilate translocation from the source to the sink (24). Researchers have found that the harvest index in sweet potatoes increases with crop age and that the peak period varies with genotype (20).

Table 4. Mean performance of Chinese potato (*Plectranthus rotundifolius*) genotypes for tuber yield characters

S.No	Treatment	Smallest tuber weight (g)	Medium tuber weight (g)	Largest tuber weight (g)	Total yield plant^{-1} (g)
1	PKM-CP-1	5.7	10.0	15.5	288.0
2	PKM-CP-2	6.7	10.9	20.2	333.8
3	PKM-CP-3	5.4	9.8	14.8	280.6
4	PKM-CP-4	6.3	10.2	16.9	316.3
5	PKM-CP-5	6.2	10.1	15.6	298.3
6	PKM-CP-6	3.2	8.6	13.3	275.7
7	PKM-CP-7	5.4	10.2	15.1	284.9
8	PKM-CP-8	6.3	10.6	16.5	311.8
9	PKM-CP-9	3.7	8.7	13.7	234.9
10	PKM-CP-10	6.5	10.4	18.4	319.3
11	PKM-CP-11	2.6	7.5	11.5	182.8
12	PKM-CP-12	4.8	10.1	14.5	270.8
13	PKM-CP-13	4.1	9.5	14.1	248.7
14	PKM-CP-14	4.3	9.5	14.1	253.0
15	PKM-CP-15	3.9	9.3	13.9	243.7
16	PKM-CP-16	5.3	10.2	14.7	274.9
17	PKM-CP-17	2.9	7.7	11.8	205.2
18	PKM-CP-18	5.2	10.1	14.6	271.9
19	PKM-CP-19	2.4	7.6	11.3	173.0
20	PKM-CP-20	4.4	9.6	14.3	255.7
21	PKM-CP-21	3.2	8.1	12.2	218.1
22	PKM-CP-22	2.1	7.3	11.5	159.2
23	PKM-CP-23	1.7	7.0	11.0	138.7
24	Sreedhara	6.1	11.1	16.1	302.0
25	Nidhi	5.8	10.9	15.2	288.8
26	PKM-CP-24	6.3	10.9	16.3	309.8
27	PKM-CP-25	3.1	7.6	12.1	207.1
28	PKM-CP-26	6.2	10.3	16.2	309.5
29	PKM-CP-27	3.2	7.8	12.2	215.6
30	PKM-CP-28	2.2	6.9	11.4	151.9
31	PKM-CP-29	2.1	7.2	11.3	163.8
32	PKM-CP-30	4.7	10.2	14.5	266.0
33	PKM-CP-31	3.6	7.8	13.0	218.9
34	PKM-CP-32	4.5	10.0	14.3	257.6
35	PKM-CP-33	6.3	10.0	16.2	305.4
36	PKM-CP-34	3.9	9.1	13.8	240.2
37	PKM-CP-35	3.5	8.0	12.5	223.4
38	PKM-CP-36	4.9	10.3	13.0	279.8
39	PKM-CP-37	2.4	7.4	11.2	161.9
40	PKM-CP-38	3.1	8.4	12.7	229.5
SE (d)		**0.1027**	**0.2214**	**0.3198**	**8.8581**
CD (0.05)		**0.2921**	**0.6295**	**0.9090**	**25.1797**

Conclusion

The present study successfully evaluated 40 germplasms of Chinese potato (*Plectranthus rotundifolius*) under an 8-year-old coconut-based cropping system in Tamil Nadu, revealing significant genotypic variation in growth and yield traits. Among the evaluated accessions, PKM-CP-2 emerged as the most promising germplasm, recording the highest values in key yield parameters such as tuber number, length, width and fresh tuber weight (333.8 g plant^{-1}), followed closely by PKM-CP-10, PKM-CP-4 and PKM-CP-8. Conversely, PKM-CP-23 consistently recorded the lowest performance across most traits. These findings underscore the potential of integrating high-yielding Chinese potato germplasms into coconut interspaces to optimize land use and enhance smallholder income. The study confirms that intercropping Chinese potato under coconut plantations is agronomically viable and economically beneficial. Continued research and selection of superior germplasms can further promote crop diversification, support sustainable agriculture and enhance the commercialization of Chinese potato as a valuable secondary crop in coconut-based systems.

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Authors' contributions

The study was conceptualized by MT, PM and TP, who also developed the methodology. MT and PM provided the necessary resources and managed data collection, while the investigation was conducted collaboratively. Formal analysis was performed by KN and MG. The original draft of the manuscript was prepared by SS, under the supervision of KS and SS. All authors reviewed and approved the final version of the manuscript.

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