P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating (2025): 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 12; December 2025; Page No. 578-582

Received: 17-09-2025
Accepted: 22-10-2025

Indexed Journal
Peer Reviewed Journal

Nutri gardens: A sustainable approach to strengthen household nutritional security in rural areas of Krishna District, Andhra Pradesh

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DOI: https://www.doi.org/10.33545/26180723.2025.v8.i12h.2811

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Abstract

Background: Rural women who showed interest and possessed backyard space were selected for the backyard nutri-gardening intervention in the adopted villages of Krishi Vigyan Kendra, Ghantasala. During 2023-2025, about 120 nutri-garden kits were distributed to women beneficiaries from Ghantasala, Ghantasala Palem, Tadepalli, Srikakulam, Daliparru, Bodagunta, Ravivaripalem, Mopidevi, and Kaza villages of Krishna district under the Front-Line Demonstration programme of Krishi Vigyan Kendra, Ghantasala.

Methods: Among the 120 respondents, 39 per cent were illiterate, 46 per cent had attained primary education, and 35 per cent had secondary education. Each nutri-garden kit comprised 14 different vegetable seed varieties procured from Dr. YSR Horticultural University, Venkataramannagudem.

Conclusion: The study indicated that backyard nutri-gardening in rural areas significantly reduced household expenditure on vegetables while enhancing the availability of a variety of vegetables and green leafy vegetables in the daily diet. The intervention also strengthened community interaction among participants. Furthermore, the production and consumption of vegetables and green leafy vegetables increased by 72.72 per cent and 94.08 per cent, respectively, after the adoption of nutri-gardening practices.

Keywords: Backyard nutri garden and nutritional security

Introduction

Kitchen and home gardens contribute substantially to food security among resource-poor rural households in developing countries. Low-income families frequently incur higher food costs due to purchasing small quantities at higher prices and travelling longer distances to reach markets with comparatively lower prices, which ultimately negates the cost benefits because of transportation expenses (Smit, 2001) [14].

Kitchen gardening is an effective approach for growing fresh vegetables at home using locally available materials such as empty tins, old utensils, and clay pots. It helps reduce household expenditure and time spent on purchasing vegetables while providing a healthy, purposeful, and eco-friendly activity for all family members (Cheema, K. J., 2011) [5].

The recommended daily intake of vegetables and fruits is approximately 300g of vegetables and 100 g of fresh fruits per person per day, which includes 50 g of green leafy vegetables, 200 g of other vegetables and 50 g of roots and tubers (Singh *et al.*, 2018) [13]. According to ICMR recommendations, pregnant women should consume about 100 g of green leafy vegetables daily, however, their availability remains limited. Although many rural households cultivate vegetables in their backyards for home consumption, inadequate intake of essential vitamins and minerals persists due to unorganized and seasonal cultivation practices. Considering the nutritional importance of vegetables and their low availability, Krishi Vigyan Kendra, Ghantasala has conducted various trainings and Front-Line Demonstrations under technical programmes to promote nutri gardens. A nutritional home or kitchen garden, generally located close to the household, enables families to grow vegetables, fruits, and other food crops throughout the year, thereby ensuring regular access to fresh and nutritious produce.

Nutri gardens not only save time and money but also provide a healthy, productive, and environmentally friendly hobby for the entire family. They promote recycling of household waste, particularly through the establishment of compost pits. One of the most effective ways to ensure access to a balanced diet rich in macro and micronutrients is by cultivating a wide variety of foods in the home garden. Nutri gardens generate direct income through the sale of surplus produce and indirect income through savings on market purchases, as well as through exchange of produce with neighbours. In addition to supplying fruits and vegetables, gardening offers aesthetic and therapeutic benefits, helping to reduce stress and improve overall well-being. The concept of good health extends beyond food consumption and includes physical, mental, and emotional wellness. While manual labour undertaken by the poor in formal employment is often obligatory, gardening activities are performed by choice, making them enjoyable and fulfilling.

Gardening plays a vital role in reducing acute stress and improving the overall well-being of individuals (Berg, 2011) [3]. With more than half of the world's population

facing chronic food insecurity, global food production is expected to increase by about 70% by the 2050s to meet the average daily caloric needs of the growing population. The present focus has shifted toward ensuring balanced diets and enhancing both life expectancy and quality of life by identifying food components that improve disease resistance and promote health (Agte and Tarwadi, 2012) [1]. Home gardening can be practiced with minimal economic input by relying on locally available planting materials, green manures, live fencing, and indigenous pest control methods. Therefore, home gardening serves as a low-cost, sustainable food production system that is easily accessible to resource-poor households (Marsh and Talukder, 1994) [8].

Materials and Methods

The study was carried out by Krishi Vigyan Kendra, Ghantasala in selected villages of Ghantasala, Mopidevi, and Movva mandals of Krishna district during 2023-2025. A total of 120 rural women participated in the training programmes, which aimed to enhance their knowledge on the importance of nutri gardening and the technical aspects of its establishment. Information on the socio-economic profile of the participants, including caste, education, and income, was collected. Data on major constraints related to kitchen gardening were also gathered during the trainings. Participatory Rural Appraisal (PRA) methods were used to identify constraints in vegetable production, and a preferential ranking technique was applied to prioritize the constraints faced by the participants. For each household, an area of 250 m² was allocated for establishing the nutri garden. The study covered both kharif and rabi seasons. Under the Front-Line Demonstration programme, Krishi Vigyan Kendra, Ghantasala supplied seeds of improved varieties to selected households. During the kharif season, crops such as amaranths, spinach, gongura, chukkakura, okra, bottle gourd, bitter gourd, ridge gourd, brinjal, tomato, chilli, field bean, cluster bean, and cucumber were grown, while during the rabi season, seeds and planting materials of amaranths, spinach, gongura, fenugreek, okra, bottle gourd, bitter gourd, ridge gourd, brinjal, tomato, chilli, field bean, cluster bean, and cucumber (rabi varieties) were provided.

Table 1: Availability of land for kitchen gardening among the respondents

S. No	Extent of land used for kitchen gardening	Respondents count	Percentage distribution (%)
1	House hold Court yard	50	41.66
2	Useless land near the house	20	16.66
3	Cultivated areas near the house	30	25.00
4	Area under cultivation near the tube well	20	16.66
Grand total		120	100.00

Nutrient intake for individual household members was assessed using standard food composition tables (Gopalan *et al*., 2020) [6] and subsequently evaluated against the Recommended Dietary Allowances for Indians as prescribed by the ICMR (2023) [7].

The demonstrated nutri garden model is well suited to rural households with limited cultivation space. Vegetable crop sequences were designed to ensure continuous use of the garden throughout the year. The nutri garden kit comprised vegetable crops selected for their high nutritional value and low incidence of pests and diseases, thereby minimizing pesticide use. The recommended spacing for each vegetable crop is presented in Table 2. The model produced an annual yield of approximately 250-300 kg of vegetables, sufficient to meet the dietary requirements of a typical family of two adults and three children. To assess the impact of nutriarden establishment, average yield per unit area was recorded. Additionally, dietary surveys were conducted in selected households to evaluate changes in food onsumption patterns before and after nutri garden establishment using the 24-hour dietary recall method.

Table 2: Pre-intervention awareness of respondents regarding selected scientific technologies

S. No	Selected scientific practices	Knowledge level		
		No knowledge	Low	Medium
1	Recommended sowing time	30 (50.00)	10 (16.66)	20 (33.33)
2	Improved varieties	45 (75.00)	7(11.66)	8 (13.33)
3	Seed rate	50 (83.33)	5(8.33)	5 (8.33)
4	Transplanting distance	52 (83.33)	4 (6.66)	4 (6.66)
5	IPM	55 (91.66)	3(5.00)	2 (3.33)
6	Stages of irrigation	50 (83.33)	6 (10.00)	4 (6.66)
7	Seed Treatment	56 (93.33)	2 (3.33)	2 (3.33)
8	Manure and fertilizer	45 (75.00)	8 (13.33)	7 (11.66)
9	Nutritious food and vegetables	35 (58.33)	10 (16.66)	15 (25.00)
10	Recommended daily intake of vegetables	30 (50.00)	20 (33.33)	10 (16.66)

Results and Discussion

1. Demographic information:

a. Education Status of Women

The educational status of the women participants was grouped into three categories. Among the 120 respondents, 39 per cent were illiterate, 46 per cent had attained elementary to secondary level education, and 35 per cent possessed higher education qualifications. Since the study population represented varied educational levels, adopting a non-formal method of nutrition education and intervention was deemed most suitable.

b. Occupation

All the respondents were involved in agriculture and allied

activities, which are categorized as moderate work.

c. Monthly Family Income

The selected participants belonged to the low-income group. Variations in monthly family income were observed among the respondents. About 36 per cent of the families earned between Rs. 6,000 and Rs. 6,500 per month, while 39 per cent had a monthly income ranging from Rs. 7,000 to Rs. 10,000. Many families (45 per cent) reported a monthly income below Rs. 6,000. It was also observed that joint families were socio-economically better positioned than nuclear families, as they had a higher number of earning members.

2. Nutrition Knowledge of the Women

Nutrition education was imparted to the women through structured intervention programmes. These programmes included regular contact with beneficiaries, lectures, group discussions, and method demonstrations to motivate and educate the participants. Improved availability of vegetables and fruits through nutri gardens was expected to enhance their consumption and thereby help in reducing malnutrition.

3. Impact of Nutrition Intervention

The study revealed that many of the families (65%) belonged to the medium family size category, followed by small families (45%) and joint families (10%). Prior to the front-line demonstrations, the respondents cultivated only four types of vegetables, namely bottle gourd, bitter gourd, snake gourd, and tomato. However, after the nutrition intervention, the number and diversity of vegetables grown increased substantially. The respondents cultivated 14 different vegetables, including amaranth, spinach, chukkakura, gongura, okra, bottle gourd, bitter gourd, ridge gourd, brinjal, tomato, chilli, field bean, cluster bean, and cucumber during both Kharif and Rabi seasons, as presented in Table 4.

As evident from Table 3, the nutri garden demonstrations led to a significant increase in homestead vegetable production, which in turn enhanced household consumption and enabled the distribution of surplus vegetables to neighbours and relatives. Before the intervention, respondents followed traditional practices and grew only one or two seasonal vegetables, necessitating the purchase of vegetables from the market to meet household needs. Post-intervention, vegetable production at the beneficiary level increased markedly, resulting in higher consumption (94.08%) and monetary savings. These findings are in line with the results reported by Nandal and Vashisth (2009) [9]. The contribution of various vegetables to essential nutrient intake is presented in Table 5.

Table 3: Impact of Kitchen Gardening on Rural Communities

S. No	Impact	Pre intervention	Post intervention
1	Adoption of Kitchen Gardening	15 no.	120 no.
2	Vegetable types cultivated	Green leaves and vegetables	Seasonal vegetables
3	Vegetables are grown throughout the year	Few respondents known about the *Kharif* & *Rabi* seasons	All families are maintaining it year-round
4	Average time allocation for kitchen gardening	30 min	2.5 hr
5	Impact on livelihood security	Buy vegetables on market price	Savings in household expenditure and improvement in physical health
6	Awareness regarding daily vegetables consumption	Unaware	Were aware and consumed 285-300 g per person per day
7	Production (Kg/unit) 25*10 m2	80 kg	480.7 kg
8	Market purchase (Kg)	60 kg	-
9	Distribution to neighbours (Kg)	20 kg	30 kg
10	Family Consumption (Kg)	280 kg	450 kg

Table 4: Vegetables Production in nutritional kitchen garden in rural areas

S. No	Vegetables	Production (Mean) (Kg)	Price (Rs. /Kg)	Income (Rs.)
1	Tomato	23.00	30.00	690.00
2	Brinjal	35.00	40.00	1400.00
3	Chilli	9.30	40.00	372.00
4	Cluster bean	16.00	20.00	320.00
5	Cucumber	23.00	25.00	575.00
6	Field bean	16.00	60.00	960.00
7	Ridge gourd	16.5	30.00	495.00
8	Bitter gourd	21.33	40.00	853.2
9	Bottle gourd	42.00	15.00	630.00
10	Okra	39.6	30.00	1188.00
11	Chukkakura	24.00	40.00	960.00
12	Gongura	30.00	20.00	600.00
13	Spinach	26.00	40.00	1040.00
14	Amaranths	29.00	30.00	870.00

The nutritional value of different vegetables was calculated using the formulas given by Gopalan (2020) [6] and Rana (2020) [11]. Tables 5 and 6 reveal a significant increase in the consumption of nutrients, including protein (44.37 g), fats (29.2 g), carbohydrates (200 g), dietary fiber (23.8 g), and minerals such as iron (26.5 mg), zinc (10.6 mg), and calcium (1048 mg). The results further indicate that the intake of energy, protein, and iron increased following the intervention of nutritional kitchen gardening.

Table 5: Nutritional information of kitchen gardening vegetables

S. No.	Vegetable	Energy (kcal)	Moisture (%) (wb)	Protein (%)	Fat (%)	Total CHO's (%)	Dietary fibre (%)	Minerals (%)
1	Tomato	18.67	93.62	0.9	0.47	2.71	1.77	0.52
2	Brinjal	22.88	90.00	1.48	0.32	3.52	3.98	0.7
3	Chilli	14.86	93.89	1.11	0.34	1.84	2.06	0.76
4	Cluster bean	37.17	84.65	3.55	0.37	4.91	4.83	1.68
5	Cucumber	15.00	96.00	0.7	0	3.6	0.5	0.3
6	Field bean	31.64	85.57	3.71	0.6	2.85	6.19	1.08
7	Ridge gourd	11.78	94.99	0.91	0.14	1.72	1.81	0.44
8	Bitter gourd	16.00	90.00	0.93	0.15	3.70	2.6	0.43
9	Bottle gourd	10.01	95.17	0.53	0.13	1.68	2.12	0.36
10	Okra	24.78	89.06	2.08	0.22	3.62	4.02	0.94
11	Gongura	33.49	87.42	1.86	1.09	4.06	4.59	0.98
12	Chukka Kura	29.0	94.73	2.6	0.1	4.3	3.8	0.95
13	Spinach	22.52	90.31	2.14	0.64	2.05	2.38	2.47
14	Amaranths	28.13	86.85	3.29	0.65	2.28	4.41	2.52

Source: National Institute of Nutrition (NIN) dietary guidelines for Indians (2023) [7]

Table 6: Vegetables Sowing and transplanting practices

S. No.	Vegetable	Spacing between rows (cm.)	Spacing between plant to plant (cm.)	Seed sowing depth & transplanting (cm.)	Seed cost (10 M^2)
1	Tomato	60	30	Transplanting	0.4g
2	Brinjal	75	50	Transplanting	0.4g
3	Chilli	75	45	Transplanting	0.4g
4	Cluster bean	60	15	2-3	30g
5	Cucumber	150	50	1-2	4g
6	Field bean	60	45	2-3	30g
7	Ridge gourd	200	50	2-3	10g
8	Bitter gourd	150	50	2-3	10g
9	Bottle gourd	250	75	2-3	10g
10	Okra	60	30	2-3	15g

Table 7: Mean nutrient intake and percentage adequacy among rural women

Nutrients	Pre Intervention			Post Intervention		
	RDA	Average intake	Nutrient Adequacy (%)	RDA	Average intake	Nutrient Adequacy (%)
Protein (g)	45.7	44.00	96.28	45.7	44.30	96.93
Fat (g)	20	30	150	20	29.2	146
CHO (g)	100	105	105	100	200	200
Energy (Kcal)	1660	1620	97.59	1660	1700	102.40
Calcium (mg)	1000	1010.7	101.07	1000	1048	104.8
Iron (mg)	29.0	17.8	61.37	29.0	26.5	91.37
Zinc (mg)	13.2	7.8	59.09	13.2	10.6	80.30
Dietary fiber (g)	25	18.0	72	25	23.8	95.2

Conclusion

Nutri-garden is such a concept. Looking at the seriously deficient and imbalanced diet of rural population of the country, nutri-garden can prove to be an easy and impactful intervention. The present study concludes that nutritional kitchen gardening has a significant positive impact on food security among the rural population. The intervention nearly doubled vegetable intake and enhanced both availability and accessibility, which are key components of food security. It should be seriously popularized among the rural population. The constraints faced by the respondents can be eliminated with proper approach. Extension agencies like Krishi Vigyan Kendra's can play a vital role in spreading awareness and ensuring adoption of this concept among the community. Hence, more rural families should be encouraged to adopt nutri-garden with appropriate technical way.

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