Nutri-garden Models for Household Nutritional Security in Tribal Areas of Valsad

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ABSTRACT

Under the Nutri sensitive Agri-resources and Innovations (NARI) project, KVK-Valsad conducted study during the year 2017-2020 in six villages of Kaparada block with 120 respondents to assess the VADI model and Gangama mandal design in addressing food security of tribal people of Valsad. Pooled data showed that in traditional method of home stead garden, farmers were cultivated only 6-7 crops in haphazard manner which were not enough to fulfill their requirement so they had to purchase from market. In case of Gangama mandal model, farmers could cultivate up to 32 crops, where as in VADI model upto 19 crops *i.e.,* vegetable, fruits, root crops, herbal crops, pulses etc., resulted in maximum increase in average production (134 per cent), average annual income (Rs.23,745/-), average consumption(54%) and it reduced purchase(60%) from outside market compared VADI Model and traditional method. The scaling up of proven nutrition interventions like Gangama nutri-garden model laced with more number of seasonal vegetables may be useful to improve household nutritional security of tribal people of Valsad district.

Key Words: Liquid biofertiliser, Nutri garden, Nutrition, Security Sickle cell anemia, Tribal farmer.

INTRODUCTION

ICAR has initiated Nutri sensitive Agri-resources and Innovationas (NARI) project through KVKs across the country which aimed to sensitize farm families on various aspects of nutrition to address malnutrition by bringing changes in food system through different innovations like Nutri garden, Nutri thali, Bio fortified varieties etc. Valsad district of Gujarat is pre dominant tribal area. Majority of the farmers are small and marginal resource poor tribal growing rice under rainfed condition. The continuous consumption of rice in the daily diet caused nutritional imbalance. Large population of women and children in Valsad district is suffering from the sickle cell anemia.

Vegetables play a crucial role in human's diet and rural generation should get the awareness about the importance of vegetables (Jain , 2017). During 2017-18 vegetable crops were cultivated in 10.26 Mha. with a production of 184.40 MT in India. Gujarat shares about 6.65 per cent in country with the vegetable production of 12,254.29 MT (Anon. 2018). Kitchen garden can provide year round availability, access and consumption of adequate amount and varieties fruits and vegetables which supply not only the calorific demands but also the micronutrients by the resource poor. So, kitchen gardening would be a good mean to improve household food security (Rani *et al,* 2015).Therefore, KVK assessed nutri kitchen garden models *i.e.,* Gangama mandal, developed by the Malpani trust of Devas (MP), Rectangular model (VADI model) recommended by SAU and traditional method of growing vegetables for household requirement.

MATERIALS AND METHODS

During the 2017-2020, study was conducted by KVK-Valsad in six villages of Kaparada block of Valsad district. From each village, 20 tribal poor families having space about 800 $sq.ft$ to establish nutri gardens were selected randomly. The assessment

study used qualitative and quantitative approach to collect data from households. Structured scheduled was also administered to collect personal profile of 120 respondents. Stratified sample was used to pick household respondents. Out of the 120 families, 40 families were involved in VADI model, 40 families were involved in Gangama mandal and rest of families was with the locally practiced traditional method of growing vegetable. KVK scientists were imparted training about use of eco friendly inputs and agronomic practice to all selected participants involving in assessment trial. KVK also provided 50 kg vermi compost and 5 kg neem cake, which were applied at the time of preparation of soil to avoid mortality of seeds and seedlings caused by soil born diseases. Liquid biofertilisers i.e *Azotobactor*, PSB and *Potash mobiliser bacteria* etc. were applied @ 1.25 L/ha. as seed and seedling treatment. Two spray of neem kernel extract were applied in the initial stage of the crop growth as precaution measure against attack of sucking pests. Crop wise production, cost and return data of nutri-garden model, *i.e.,* VADI model, Gangama mandal and traditional method of growing vegetable were maintained in the separate sheet provided to them. Satisfaction quotient was also recorded with pre structured questionnaire. Pooled data of three year were taken into consideration to draw interfaces.
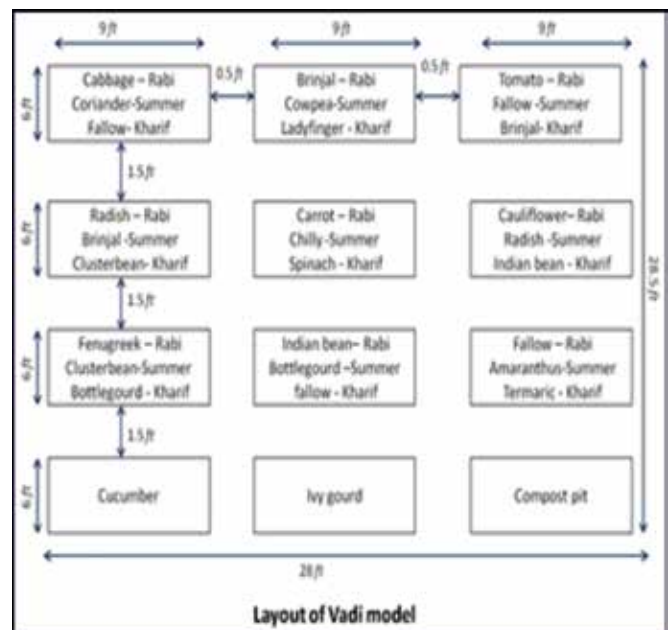
Traditional method

Farmers were normally cultivating about 6-7 vegetable crops in haphazard manner on flat bed and sometime in between the main crops in scattered manner.

VADI model

Rectangular model- VADI model having area, approx. 800 *sq.ft* (28.5 x28.0 *ft* dimension) was divided into three rows and 12 plots (each occupied 54 *sq.ft* area). 1 plot was allotted for the preparation of compost and open space of 1.5 *ft* between rows for irrigation. Two crops were grown in each plot. Thus, 18-19 crops can be grown including vine crops *i.e.,* bottlegourd, ivygourd on periphery of garden.

Gangama mandal model

Gangama mandal design of nutri garden enables to produce large no of various types of crops with limited resources like land, water, labour etc. Mandal is a circular garden 30 feet in diameter, covering less than 800 *sq.ft* area includes four circles. The diameter of outer circle is 42 *sq. ft.* The radius of two inner and inner most circles is 4 *ft.* and 3 *ft*, respectively. The whole circle is divided into seven equal parts by 1.5 *ft* pathway. Each circle has approximately 1*ft* width useful for observation of each portion and carryout various operations without disturbing adjacent plot/plants. The plants are grown in a circular beds arrayed in the centre as well as on both the sides of the path way. Fruit plants like banana may be planted in the centre or on the outer periphery. Gangama mandal is a proper combination of short and long duration vegetables including vine crops and herbal medicinal plants such as ginger, turmeric, basil, lemongrass, mint, etc. It was grown in a manner that each portion gave fresh vegetable in a required quantity to small family of five persons. On the border of outer most circle vine crops like sweet potato, bottle gourd and fruit crops like papaya, banana etc are grown. It is very flexible design can be change in accordance with the soil types, season, availability of land etc.

Layout of Vadi model

Layout of Gangama Mandal

RESULTS AND DISCUSSION

The data regarding socio-economic characteristics indicated that 89.17 per cent respondents were women farmer (Table 1). Kitchen gardening activities are centered on women, which may result in the better use of household resources and improved caring practices and empowerment of women. Thus, the simultaneous impact of home gardening programs in terms of giving women a voice and promoting their full participation in domestic life can make an important contribution to the overall development of communities. Data also shows that 64.17 per cent respondents were belongs to age group 26-35 followed by 21.67 per cent respondents from age group 15-25, indicates the interest of young farmers towards innovative approach (Arya *et al,* 2018). Further study showed

Table 1. Socio personal characteristics of respondents.   **(N= 120)**

Sr. No.	Parameters	Category	Number	Percent
1	Gender	Male	13	10.83
		Female	107	89.17
2	Age(year)	15-25	26	21.67
		26-35	77	64.17
		36-50	17	14.17
3	Type of family	Joint	81	67.50
		Nuclear	39	32.50
4	Size of family	Small (< 4 Members)	7	5.83
		Medium(5-7Members)	97	80.83
		Large (>7 Members)	16	13.33
5	Land holding	Small	102	85.00
		Medium	15	12.50
		Large	3	2.50
6	Education	Illiterate	2	1.67
		Primary education	98	81.67
		Secondary education	12	10.00
		Graduation	8	6.67
7	Annual Income	< Rs. 35,000	52	43.33
		Rs. 35,000- Rs. 65,000	63	52.50
		> Rs. 65,000	5	4.17

Table.2 Impact of nutri-garden models on production, purchase, sale and consumption of homestead garden produce. Pooled data (2017-20) (N=120)

Treatment	Nutri garden model	Production (kg)	Purchase (kg)	Share with neighbour / Sale (kg)	Consumption (kg)	No. of crops
T₁	Traditional method	241	152	5	388	7
T₂	SAU recommended VADI model	541	71	24	588	19
T₃	Gangama mandal model	564	60	25	599	32
Improvement	SAU recommended VADI model	300	-81	19	200	12
	Gangama mandal model	323	-92	21	211	25
Change (%)	SAU recommended VADI model	125	-53	417	52	171
	Gangama mandal model	134	-60	450	54	357

that out of the total 120 respondents, 81 respondents (67.50 %) from joint family, 97 respondents (80.83 %) from medium size family with 5-7 family members and 102 respondents (85.0%) having a small land holding. Data on educational status of respondents, clarified that 98 respondents (81.67 %) having a primary education followed by 12 respondents (10.0 %) having a secondary education. Although regular technical guidance and support by KVK scientists helped to bring a positive change, 52.50 per cent respondents belonged to income group of Rs. 35,000- Rs. 65,000/- (Table 1.) (Arya *et al,* 2018). Farmers showed their positive attitude towards this new innovative model of nutri-garden.

Intervention and evaluation of innovative nutri-garden models

The results (Table 2) revealed that with the traditional kitchen garden farmers can cultivate only seven different crops such as bottle gourd, brinjal, Indian bean, coriander etc. It was categorically told by every respondent of all the villages that vegetables were only cooked when available in the field otherwise not. It indicated that fresh vegetable production through farmers practices were not enough to fulfill their requirement so they had to purchase 152 kg from market. Respondents said that with the VADI model they can grew 19 different crops which increased crop production 125 per cent resulted in reduction of about 53 per cent in purchase. However with the Ganaga mandal they can grew 32 different crops which increased 134 per cent crop production results in reduction of about 60 per cent in purchase. Pooled data of trials also noted improvement in consumption of crop produce were 52 per cent with VADI model and 54 per cent with Gangama mandal compared to traditional model (Nandal and Vashisth, 2009). Domestication and inclusion of these vanishing crops in daily food was important for nutritional security (Vats, 2015).

Economic

Pooled data (Table 3) revealed that by the traditional method, farmer can produced average 241 kg with 7 crops (bottle gourd, brinjal, coriander, fenugreek) etc. with the average annual economic benefit of Rs. 4,912/-. It was also noted that highest average annual economic benefit of Rs. 23,745/- with average production 564 kg by the growing of 32 crops in innovative Gangama mandal model, besides SAU recommended VADI model produced 541 kg with 19 crops with the average annual economic benefit of Rs. 16,959/-.

Table 3. Impact of nutri-garden models on average crop production and economy of tribal farmers Pooled data (2017-20). (N=120)

Sr. No.	Vegetable	Traditional farmer method		SAU recommended VADI model		Gangama mandal model	
		Average yield (kg/Annum)	Average Income (Rs./ Annum)	Average yield (kg/annum)	Average Income (Rs./ Annum)	Average yield (kg/circle/ annum)	Average Income (Rs./ Annum)
1	Brinjal	148	2213	34	510	9	137
2	Bottlegouard	46	1160	206	5138	65	1623
3	Indian bean	23	821	9	302	2	70
4	Coriander	2	56	52	1575	31	942
5	Fenugreek	1	45	40	1582	28	1130
6	Ivy gourd	19	560	72	2164	62	1867
7	Spinach	2	57	52	1825	41	1435
8	Clusterbean			6	407	1	93
9	Amaranthus			10	967	5	545
10	Turmeric			1	102	1	46
11	Cowpea			2	161	1	77
12	Cauli flower			6	177	4	107
13	Lady finger			2	89	2	78
14	Chilly			2	64	2	55
15	Tomato			2	54	1	43
16	Cabbage			6	158	3	75
17	Cucumber			25	762	18	540
18	Radish			9	645	4	266
19	Carrot			4	279	3	169
20	Basil					2	234
21	Lemmon grass					5	203
22	Mint					2	193
23	Garlic					7	526
24	Marrygold					12	1174
25	American corn					10	834
26	Ginger					10	964
27	Onion					13	941
28	Papaya					72	4700
29	Banana					85	512
30	Lemon					29	2861
31	Sweet potato					23	459
32	Beet root					11	845
	Total	**241**	**4912**	**541**	**16959**	**564**	**23745**

CONCLUSION

Fruits and vegetables are not only rich in minerals and vitamins but also; contribute in a big way in maintaining health, overcoming hunger and malnutrition. The nutri-garden ensures access to healthy diet with adequate macro and micronutrients at doorstep. Gangama mandal model-an innovative design of nutri-garden provides opportunity to grow 30- 32 different type of crops concludes it to be an effective and sustainable means of improving nutritional standards of low-income rural families through integrated household food production.

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