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Doubling Farmers Income Through Production of Quality Planting Materials of Greater Yam in the Tribal Belts of Kerala

Although tuber crops are common components in cropping systems and in homesteads, farmers of Kerala usually cultivate locally available varieties with poor yields. Tribals and tuber crops are interconnected from ancient times. Yams are the major tuber crops in tribal areas as they play crucial role in food and nutritional security of the tribal population. Although yams are not cultivated in a systematic manner, tribals consume naturally occurring roots and tubers, without adequate knowledge of their food or nutritional values. In the recent past, economic importance of tuber crops was realised for its importance as food, feed, fuel and future crops and therefore the demand for quality planting material has also increased. So improved varieties identified for tuber crops are to be popularised and quality planting materials are to be ensured for the farmers. Greater yam is one such crop, having the status of a food security crop among the tribal farmers of Kerala as well as in many states in India.

In cereals, the planting material multiplication ratio is 1:140 or even above, while in greater yam, it is 1:4 or 1:6. Normally, greater yam or *Dioscorea* is cultivated by using corm pieces (setts) of 250 g to 300 g cut from the seed corm or whole corms of small size. So invariably farmers have to keep aside a share of their produce for seed purpose. However, use of such a large quantity of planting material as seed corm results in low multiplication ratio and less availability of planting materials of improved varieties. This low multiplication ratio is mainly responsible for the undue delay for the released high yielding varieties to reach the farmers.

The underground stem tuber, or corm is extensively used as a staple food and as a favourite vegetable by millions of people in India. It is a popular vegetable among the people of Kerala, Andhra Pradesh, Maharashtra, Odisha, Chhattisgarh, Jharkhand, Gujarat etc. Farmers grow many local cultivars varying in yield levels, and cooking quality. Many wild species of yams are grown in interior tribal areas, which they consume as food, especially during off season. Improved varieties with high tuber yield, cooking quality, rich in minerals and antioxidants are released from ICAR-CTCRI, Thiruvananthapuram. However, the availability of quality planting material of these varieties remains to be a constraint for popularisation of these varieties. So, an attempt was made to involve tribal farmers of Attappadi region of Palakkad and Wayanad districts, two major tribal tracts of Kerala, for quality planting material production of greater yam varieties. Indirectly, the programme aimed at improving the food and livelihood security, increasing income from farming and generating employment opportunities to the tribal farmers. The programme was implemented under the project on Development of tuber crops financed by the Govt. of Kerala.

Two tribal dominated panchayats of Kerala viz., Sholayur in Attappadi region of Palakkad district and Thavinhal of Wyanad district were selected for implementing the Development of tuber crops programme. At Sholayur, the programme was implemented during 2013-2014 and at Tavinhal, it was implemented during 2014-2015. A total of 50 beneficiary famers were selected from each of the two locations with the help of Krishibhavan, Department of Agriculture, Govt. of Kerala.

Quality planting material of yam varieties Sree Keerthi, Sree Karthika, Sree Roopa and Sree Shilpa, 125 kg each, for covering an area of 10 cents of each beneficiary, thus covering a total of 2 ha was distributed in each district. Two skill based training programmes on scientific cultivation practices including organic farming, mini sett planting (James George et al., 2004), seed treatment, plant protection measures, harvesting and storage of seed corms, seed standards etc were organized in each district. Scientists and experts visited the fields periodically for giving technical advices on intercultural operations,

remedial measures for anthracnose disease, rouging of unhealthy plants etc. The crop was raised under rainfed conditions, wherein an average of 2000- 2500 mm rain was received every year. At Attappadi, most of the farmers resorted to organic farming and at Ambalavayal, an integrated approach was followed to meet the standard nutrient requirement of 80-60-80 kg ha^{-1}. Financial assistance was given to farmers taking into account the cost of cultivation and the land development work. In each location, corm yield was recorded at the time of harvest at 10 months after planting. From the average production of corms per ha, projected estimates of planting material production and area expansion possible over a period of three years was worked out.

Based on the random sampling, an average corm yield of 34.93 and 31.25 t ha^{-1} was obtained at Sholayur and Tavinhal respectively. Corm yield varied between 2.3- 3.5 kg per plant at Sholayur with an average yield of 2.83 kg per plant. At Thavinhal, corm yield ranged between 2 to 3 kg per plant with an average yield of 2.5 kg per plant. Local yams are available in both the tribal areas, and were not cultivated scientifically. A part of the produce will be taken for consumption, rest will be left in soil for subsequent growth. The improved varieties along with better soil and management conditions resulted in a better harvest, even under coconut and arecanut gardens which could be used as standards for trailing.

Based on the analysis of corm yield data recorded from different panchayats, a projection on the quantity of planting material produced as well as probable area expansion over a period of three years is given in Fig. 1. and 2.

Keeping aside 20% of the produce for own planting and home consumption, the rest was available for disposal among the neighboring farmers and nearby areas for planting (Table 1.). The probable area expansion was estimated based on the seed supply chain over a period of three years. It was projected to cover an area of 282 ha with the improved varieties within a period of three years, if the seed chain goes successfully. It was also possible to link the needy farmers of neighboring districts with the seed producing farmers through the project, thus creating an avenue for gaining additional revenue to tribal farmers.

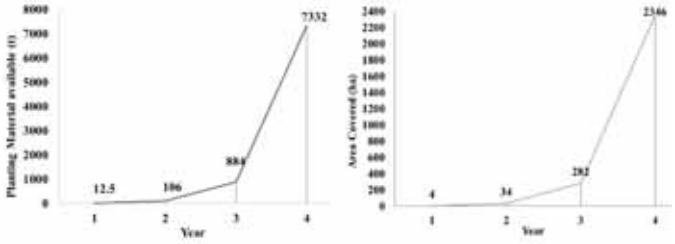

Fig.1. Projected estimate of greater yam planting material production and area coverage

Table 1. Planting material multiplication through the programme

Crop: Greater yam	Sholayur	Thavinhal
Average tuber yield per 10 cents	1.4 t	1.25 t
For 50 selected units (2ha)	70 t	62.5 t
20% (home use)	14 t	12.5 t
Corms available as seed material	56 t	50 t
Area expansion possible (2nd year)	17.92 ha	16.0 ha

Taking into consideration of the cost of greater yam corms, transportation, field preparation, planting and other related expenses, the total cost of cultivation was estimated to be ` 8,000 at Tavinhal and 10,000/- at Sholayur for an area of 10 cents. Undulating topography which necessitates land development works for planting resulted in a higher cost of production in Sholayur. However, planting materials and cultivation expenses were distributed to beneficiary farmers from ICAR-CTCRI under the scheme. On an average, farmers got a corm yield of 2.83 kg at Sholayur and 2.5 kg per plant at Tavinhal. At the time of harvest, tuber price in the local markets was ` 30 to 40 per kg. Average B:C ratio was worked out to be 3.2: 1 at Sholayur and 2.9:1 at Tavinhal (Table 2).

Table 2. Economics of elephant foot yam cultivation in farmers fields (10 cents)

Item	Sholayur	Thavinhal
Cultivation expenses including cost of planting materials (in `)	10,000/-	8,000/-
Corm yield	1400 kg	1250 kg
Gross returns @ 30 per kg for tuber) (in `)	42,000/-	37,500/-
Net returns (in `)	32,000/-	29,500/-
B:C ratio	3.2:1	2.9:1

Highly fertile soil, indigenous knowledge, comparatively pest and disease free environment, compatibility of greater yam with the present homestead farming systems and the inclination towards yams as their traditional food were the strengths identified for enhancing the food security and socio economic status of tribal farmers through the present intervention. By involving the tribal farmers in the planting material multiplication programme, their employment opportunities as well as the income could be enhanced. Inadequate and untimely rainfall, wild boar attack in farmers fields, shift towards other crops, highly undulating topography and lack of transportation facilities and access to markets etc., are some of the constraints identified in these areas, which may reduce the production and distribution by more than 50%, in some cases. However, it is felt that, the requirement of quality planting materials of improved greater yam varieties could be achieved to some extent through tribal farmers participatory approach, in addition to enhancing farmers income.

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