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Research Article

DISSEMINATION OF CULTIVATION PRACTICES AND VALUE ADDITION OF GRAIN AMARANTH (*Amaranthus caudatus* L.)

M.Umadevi*, P.S.Devanand, M. Tilak and K.Kumaran

Forest College and Research Institute, Mettupalayam

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ABSTRACT

Amaranthus sp. are the most popular leafy vegetable in Tamil Nadu and the another species *Amaranthus caudatus* L., are grown exclusively for grain purpose because of its nutritional quality. This not only improves the status of farm women and also improves their family nutritional quality also. Fifty tribal people participated from the village of old Sarkarpathi, Pollachi. In this training, explained the cultivation practices of grain amaranth, hands on experience for different value added products like laddu, amaranth grain pori, porridge to tribal women, displayed different byproducts which are available in market and also gave different minor millets seeds pockets, tree seedlings to the participants. All the demonstration plots established at the project were harvested and utilized by the tribal farmers. From the post evaluation survey, they indicated that their final choice would be based on the marketing facility of value added products of grain amaranth and there is a need for developing an appropriate strategy to make the seeds available to farmers.

INTRODUCTION

Amaranth is a self-pollinated crop, but wide variation in genotypes exists due to varying amounts of outcrossing and frequent interspecific and inter-varietal hybridization (Ray and Roy, 2009 and Mosyakin and Robertson, 1996). Amaranthus L. is a genus of Amaranthaceae family with around 70 different species distributed worldwide including pigweeds, water hemps and grain amaranths (Sauerbeck, 2002). There are two types of Amaranth species, grain type (*A.caudatus, A. cruentus and A. hypochondriacus*) and vegetable type (*A.dubius, A.tricolor* and *A.cruentus*). Grain Amaranth species are of new world origin, *A. caudatus* from Andean Peru and Ecuador, *A. cruentus* and *A. hypochondriacus* from Mexico and Central America. This has been classified under the group of crops called pseudocereals, it displays wide morphological diversity which have unique qualities, nutritional importance, drought tolerance, disease and pest resistance, high yield in production, and increasing rate of consumption have made this crop more attractive for cultivation. Nowadays, the grain amaranths are cultivated from the temperate to tropical zone. Compared with other crops, this pseudo cereal is rich in protein (17–19% of dry weight) with double the amount of essential amino acids than wheat grain protein (Bressani *et al.,* 1987). The cultivation of amaranth was banned by the conquistadores upon their conquest of the Aztec nation. Because the plant has continued to grow as a weed since that time, its genetic base has been largely maintained. Research on grain amaranth began in the United States in the 1970s. By the end of the 1970s, a few thousand acres were being cultivated. Much of the grain currently grown is sold in health food shops. The popped grain is mixed with melted jaggery in proper proportion to make iron and energy rich "laddus," a popular food provided at the Mid-day Meal Program in municipal schools. Amaranth grain can also be used to extract amaranth oil - particularly valued pressed seed oil with many commercial uses.

In dry tropical regions of India, human livelihood opportunities are often closely linked to soil fertility conditions. This zone where in tribal people live notwithstanding a common social background and possessing almost similar natural resources, tribal farmers of a locality exhibit surprisingly drastic dissimilarity in their economic status. In such situations, more often than not, the factor determining the economic well being of farmers is soil fertility. In particular, the biological component of the soil, represented by living organisms and dead organic matter, is the major factor limiting fertility of dry land soils. Therefore, improving the biological fertility is usually a priority of land development programmes. If activities designed for such purposes also afford an opportunity to earn a livelihood, the eventual benefit realised is much larger.

Corresponding author:* **M.Umadevi
Forest College and Research Institute, Mettupalayam

Fig 1 Field view of grain amaranth at old Sarkarpathi, Pollachi, Coimbatore

Fig 2 Demonstration of value added products of grain amaranth

Fig 3 Demo on vermicompost preparation

Fig 4 Feedback from the farmers

Making them realise that the land they possess can be turned into a valuable asset and encourage them to return to their farms is the primary requirement of any development initiative. In this regard, in tribal area development programme strategy has been to introduce sustainable systems such as tree-based farming, growing under utilised pulse crops and encourage practices such as the use of compost to supplement the biological fertility of soil.

Although several methods of composting are practised, vermicomposting has been the most popular method.

By keeping all the benefits of grain amaranthus in mind a demonstration plot was raised and conducted field day training during maturity stage of the crop and demonstration plot on vermicompost also raised to impart knowledge on cultivation techniques, preparation of value added products, marketing

opportunities to tribal farm women and farmers and utilize their own farm and house waste for organic farming.

MATERIALS AND METHODS

The experiment was conducted during 2018 at the farm of tribal village at old Sarkarpathy, Anamalai Tiger Reserve, Pollachi, Coimbatore as a part of the Tribal Sub Plan of ICAR-AICRN on Potential Crops Scheme. Because of the limited quantity of seeds, the experiment was raised with promising grain amaranthus germplasm in augmented block design (Federer, 1991) in two rows along with checks *viz.,* Suvarna, Annapurna. Plants weres paced 45 cm apart between and within rows, with an inter-plot spacing of 15 cm. Cultural practices were as suggested by Van Sloten, 1981. Neither chemicals nor fertilizers were used during the experiment and weed control was by hand as and when due.

The tribal farmers were also exposed to prepare the vermicompost and its usage. The substrate for vermicomposting, on weight basis, is three parts of dry biomass (chopped into pieces of less than 10 cm) and two parts of wet dung. The biomass and dung are mixed well and wetted to have an overall moisture content of 20-30%. At this moisture level, a ball made by pressing the substrate particles together breaks up when dropped. If it does not break up, the moisture is too high whereas a ball cannot be made if the substrate is too dry. The substrate is made into a bed of desirable length in Silpaulin kept in shady conditions with a temporary roof so as to prevent sunlight and direct exposure to rodents and birds. After two weeks, 1000 earthworms were collected from Microbiology unit and introduced for every m^3 of substrate. The substrate is stirred and turned once a week, water sprinkled if it is too dry and the bed remade.

RESULTS AND DISCUSSION

Fifty tribal people participated from the village were participated and the Chief guest Th.V.Ganesan, IFS, CCF&FD explained about the importance of the crop and marketing facilities. Dr. K.K. Suresh, Dean (Forestry) and Dr.K.Kumaran Professor and Head (DFBT) shared their experience on grain amaranth and its uses (Fig 1). In this training, Dr. P.S.Devanand and Dr.M.Umadevi, Assistant Professor (PBG) explained the cultivation practices of grain amaranth, hands on training for different value added products like laddu, amaranth grain pori, porridge to tribal women (Fig 2), displayed different byproducts which are available in market and also gave different minor millets seeds pockets, tree seedlings to the participants.

Composting is the process by which biomass is broken down to humus, which has several beneficial effects on soil physical and chemical properties. Further decomposition of humus releases the nutrients contained in it for crop uptake. A requirement for composting is organisms that feed on biomass and break it down to physically finer particles and chemically less complex substances. In nature, earthworms and microorganisms decompose dead biomass. When this process is initiated with the deliberate introduction of earthworms into a stack of biomass, it is called vermicomposting.

The quality and the state in which biomass is available in the tribal settlements has a relevance as to why vermicomposting is preferred to other methods of composting. Of the limited biomass available, farmers use straw, leaf litter and tender stem as fodder for farm animals while hardy stem and coarse leaf are sources of domestic fuel. The leftover biomass, after these immediate priorities are met, is coarse material that does not break down easily. In such material, earthworms are more effective in initiating the decomposition process and paving the way for subsequent microbial action.

Another source of biomass available to farmers is cattle dung. It is an excellent substrate that undergoes composting on its own and becomes farmyard manure of very high quality. Unfortunately, the dung available with small farmers does not compost well because of the state in which it is available. Animals owned by them usually graze in the open and the dung is relatively dry when collected. It is then left in a collection pit where it loses more moisture. Therefore, dung collected in the open, unlike fresh dung, does not have the microbial populations in required numbers to decompose into farmyard manure. However, it becomes an excellent substrate for vermicomposting when wetted.

Procedure for Preparation of value Added Products of Grain Amaranth

Amaranth Laddu: Rajgira is amaranth seed or grain. It is also called Ramdana and Chaulai. These ladoos are extremely popular & delicious, and healthy as well. container. Rajgira is a very versatile seed whose flour is used to prepare paratha, poori, roti and the grain can also be used to make kheer and chikki. Rajgira chikki and laddoo are a popular Indian street food too. Rajgira grain and flour is used in festival fasting. It is a gluten-free grain.

Ingredients

- 1 cup rajgira/amaranth grains
- 1 cup gur/jaggery, broken into small pieces
- 1 tbsp desi ghee/clarified butter

Procedure

1. Sift the grain amaranth to remove foreign matter.
2. Heat a kadahi, add 1 tbsp of grain at a time and roast them until they pop up. Keep stirring all the while.
3. Sift the popped grain and discard the unpopped ones.
4. On medium heat put the desi ghee in a kadahi. When it melts put in the jaggery and stir continuously until it melts a bit.
5. Put in the water and keep stirring until it melts completely. Cook for one more minute.
6. Remove from the heat and put in the popped grain amaranth and keep mixing quickly until well combined with the jaggery.
7. Wet your hands with some water and make the laddos wetting them each time you make a laddoo.
8. Cool the laddos completely then store in an airtight container. Will keep good for a month and more.

Success of the Training

All the demonstration plots established at the project were harvested and utilized by the tribal farmers. From the post evaluation survey, they indicated that their final choice would be based on the marketing facility of value added products of grain amaranth and there is a need for developing an

appropriate strategy to make the seeds available to farmers (Fig4).

CONCLUSION

Research findings such as evaluation, cultural practices etc. will help in establishing the agro-ecological zones and the best cultural practices for growth and production of grain amaranth. This will be disseminated to the farmers through farmer to farmer approaches and other existing extension mechanisms. This in turn will provide an opportunity for improved food security, income and nutrition of the rural farmers/small farmers thus contributing to their improved livelihood. Hence, this training will impart knowledge, skill and improve farm income through cultivation of grain amaranthus and value added products to the farm women and tribal farmers

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