

Entrepreneurship Development in Maize Processing

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Abstract

Maize or Corn (*Zea mays*) is a plant belonging to the family of grasses. It is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. In India, maize is the third most important food crop after rice and wheat. Maize in India contributes nearly 9 per cent in the national food basket and more than Rs. 100 billion to the agricultural GDP at current prices apart from the generating employment to over 100 million man-days at the farm and downstream agricultural and industrial sectors. In addition to staple food for human being and quality feed for animals, maize serves as a basic raw material and as ingredient to thousands of industrial products that includes starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries etc.

Keywords: Maize; Corn; Cereals

Introduction

It is an important cereal crop of southern Rajasthan grown during rainy season. Rajasthan has the largest area of maize in India i.e. 1 million ha with production of 1.1 million tones and productivity of 1,100 kg/ha. The area under maize in Mewar and Vagad region of southern Rajasthan is 9.16 lakh ha, which is approximately 80 per cent of the state. It was a staple food crop of people living in southern Rajasthan (Mewar and Vagad regions) since ancient time. People of Mewar and Wagad regions consume maize flour in preparation of roti whereas in urban and semi-urban areas of southern Rajasthan people generally prepare maize dishes like dhokla, papad, etc. in winters.

In Rajasthan there are no maize processing plants except small animal feed industry due to which majority of maize produced in the state is being sent to other states for industrial purposes compelling the farmers to sale their crops at very low cost. The role of private sector in ensuring availability of maize based value added commercial products is crucial and of major concern. Private sector may play an important role in identifying potential markets for quality seed supply, transfer of new technologies, for imparting training and education to farmers, creating market for innovative maize commercial products, ensuring availability of maize products to the consumer and thus increasing the supply demand of maize which ultimately benefits the maize growing farmers. Maize offers great potential both for internal consumption as well as export in the world. There is need to harness this opportunity in our national interest.

Maize grain contains about 10 per cent protein, 4 per cent oil, 70 per cent carbohydrate, 2.3 per cent crude fiber, 10.4 per cent albuminoids and 1.4 per cent ash. Maize grain also has sufficient quantities of vitamin A, nicotinic acid, riboflavin and vitamin E. Maize crop

furnishes huge quantities of green fodder for the cattle. Maize primarily known as corn in India, Maize is widely cultivated throughout the world, and a greater weight of maize is produced each year than any other grain. India is the largest producer of Maize in the world, with 14.06 lakh MT during the year 2011. The country ranks sixth in Maize production with 3.39 percent share in total work production. Maize contains 60 - 68 per cent starch and 7 - 15 per cent protein. Opaque varieties have more nutrition and contain a high percentage of essential amino acids. Yellow seeded maize is the richest source of vitamin-A. It has more riboflavin as compared to wheat and rice and is a rich source of phosphorus and potash. Maize seed contains 1.2 to 5.7 per cent edible oil. On the other hand maize seeds are deficient in lysine and tryptophan. Due to continuous use of maize in villages of tribal dominated areas, people are suffering from "Pellagra disease". To overcome the condition of malnutrition in tribal areas QPM was introduced in Rajasthan in recent years. But area under QPM is very meager. Further, the value added products of QPM is yet to be tested for its keeping quality and nutritional value. Whereas, the scope of traditional maize value added products will remain in future due to food habit.

Quality protein maize

Quality protein maize is superior to normal maize in its amino acids (lysine and tryptophan) balance and nutrient composition. It was developed by Dr. Surinder Vasal and Dr. Evangelina Villegas at the International Maize and Wheat Improvement Center (CIMMYT) in the late 1990s. For their achievement, they won the 2000 World Food Prize. Since QPM contains 50 per cent more lysine and tryptophan than normal maize, it is useful in the commercial production. It therefore has an advantage over normal maize to ameliorate the effect of malnutrition cost effectively. The (QPM) can be a substitute for the more costly sources of protein for human food such as meat and for fishmeal or artificial lysine used in the production of feeds for poultry and pig enterprises. Normal maize contains limited contents of two essential amino acids namely Lysine and Tryptophan, hence having low quality of protein.

QPM can help to reduce malnutrition, improve body immunity and overall health in communities that are constrained by economic and environmental factors to access expensive sources of protein such as meat, fish, eggs, milk and legumes. Several million people, particularly in the developing countries, derive their protein and calorie requirements from maize. The maize grain accounts for about 15 to 56 per cent of the total daily calories in diets of people in about 25 developing countries, where animal protein is scarce and expensive and consequently, unavailable to a vast sector of the population.

Centre of excellence on processing and value addition of maize" initiated in 2014 under nutri farm pilot scheme, Government of India, is continuously working on preparation of commercial maize products which are not available in market till now. In this project, preparing number of commercial bakery, ready to eat and extruded products which including nankhatai, coconut cookies, salted biscuit etc. which are ready to introduce in food industries. This centre develops wide range of value added products of maize and made popular among masses in various on as well as off campus trainings. The commercialization of Quality Protein Maize (QPM) based food products is the output of Farmer, Entrepreneur, Institution and People (FEIP) chain, a revolutionary though generated by the scientists associated with project Centre of excellence on Maize.

QPM is an improved variety of maize which contains higher amount of lysine and tryptophan. Maize based value added products are not available in the market for the consumer, even though products developed from maize has high market potential and most important food alternative to gluten sensitive patients. Looking to the facts, there is a vast scope of preparation of nutri-rich products of maize and entrepreneurship establishment in the Mewar-vagad region of the southern Rajasthan. Such attempts not only will lead to entrepreneurship establishment of value added processed maize products but also provide opportunity of export of maize products and also help to overcome problem of mal-nutrition in tribal dominated areas of southern Rajasthan. Consumers with special dietary needs both for specific health conditions and the general health concerns of our aging population offer more opportunities for new products. For example, there are more than two million people with life-long, incurable celiac disease, who must avoid all gluten (from wheat, rye and barley) in their diets. Gluten-free foods have been difficult to find and remain expensive, but for celiac disease sufferers, they are well worth the

effort and expense. For such people value added products of QPM has great potential in the market. QPM based products are highly demandable in upcoming market due to following reasons:

- Use of maize flour reduces the cost of raw material in comparison to RWF based food products up to 30 per cent, therefore creating scope for more profit margins.
- No competitor is available in the market for QPM based products.
- These products are innovative and more nutritious due to better protein and fiber content.
- Target Population are those who are looking for an alternative to lessen or replace their RWF intake by these products.
- It supports maize growers to en-cash their crop and earn profit at maximum level.
- It is specially designed for people who are suffering from celiac disease or having gluten sensitivity.
- Bengal gram flour is four times costlier than Maize flour, so this product can be good option for economically weaker section.
- The products have good scope for profit margins.

QPM based bakery and extruded products such as nankhatai, salted biscuits, coconut cookies and pasta etc. are highly acceptable by trainees, visitors and other consumers. The products are prepared after the preparation of flour blends following a standard formulation, with the addition of different levels of QPM flour with refined wheat flour and standardised for one of the formulation consisting QPM flour quantity as 50 percent of the total mix except in coconut cookies which was purely of maize flour and grated coconut. Other dry ingredients used include semolina, milk powder and baking powder, cardamom powder which were mixed in the dry flour and sieved twice for uniform mixing. The formed products were then baked in a pre-heated oven at 180°C for 15 to 20 minutes for uniform baking. The demand of QPM based food products in the market has helped in creating production-consumption chain management for QPM. The impact of commercialization of value added QPM based food products can easily be realized through gross evaluation of the system. Results showed that the protein concentrations improved in the developed QPM based Coconut Cookies. Salted biscuits are consumable by all age group as snack with tea or coffee. The nutritional value of QPM based bakery products are given below.



Figure 1: QPM based commercial food products.

S. No.	Products	Protein g/100g	Fat g/100g	Fibre g/100g	Minerals mg/100g	Carbohydrate g/100g	Energy Kcal/100g
1	Nankhatai	5.64	31.16	0.52	0.75	65.63	565.75
2	Salted Biscuit	8.53	27.3	0.81	0.94	87	566
3	Coconut Cookies	4	32.7	1.78	1.6	46.2	553

Table 1: Nutritional value of QPM based bakery products.

Keeping the fact in the mind that transfer of technology and dissemination of the knowledge is one of the most important aspect of any research and adoption of the technologies Centre of Excellence on Maize has made tremendous efforts to transfer the technologies to the various sections of the population like farmers, farm women, youth, potential entrepreneurs, rural youth from different states, agriculture supervisors, extension functionaries have been targeted and benefited. These training programmes were divided into two parts; first part comprising of lecture by experts to provide technical knowledge and information from different fields and then to convert theoretical knowledge in to practical experience i.e. learning by doing, second part dealt with the intensive practical sessions of processing, preparation of different value added products of maize and maize processing technologies were planned and conducted.

To ensure better understanding and learning of product preparation and value addition and to retain the knowledge gained during the training program Hindi training manual entitled “[kk] izlaLdj.k,oa ewY; loa/kZu” developed and supplied to the every participants. To evaluate the effectiveness of the trainings organized, post training evaluation in every training been done by the subject experts and university administrative. Monitoring of the trained personnel is being done from time to time and still ongoing. The training programmes for youth entrepreneurship were organized. Two entrepreneurs composing of one female and one male were identified from the Udaipur city. They were already producing and selling some snacks item at their home. Both of the Entrepreneurs were trained on commercial production of all the maize value added products. They have been guide on various sources for financial assistance to set up their own small scale maize based products manufacturing unit. They now are running their own household level small bakery unit and selling the maize nankhatai and salted biscuits at local levels like small shops, local bakeries and on demand supply to specific customers.



Figure 2

One more Entrepreneur named Vidya Singh Chauhan has been trained under the entrepreneurship development program for continuous one month. Now she has got the expertise in the manufacturing and selling the maize products. She is continuously selling the nutritive nankhatai as and when demands occur. Recently she has received order of supplying 5000 pieces of nankhatai. Centre of Excellence is providing basic facility and equipment related support so that she can achieve her target.



Figure 3

Several initiatives were taken to make people aware about the innovative maize products.

- Demonstration of Maize products at in University Kisan Mela.
- Showcasing of Maize products in different school's small trade fair to make parents and kids aware about the value added products of maize.
- Supply of Sample kits to various government officials, administrative representatives, industry representatives, entrepreneurs, potential women and progressive farmers.

For the popularization of the Products among people these products were served to people from university and outsiders. Besides products were served to the following dignitaries:

Window of opportunities

In India maize is the third most important cereal after rice and wheat which ensures availability of this grain in abundance. Very few maize based commercialize products (cornflakes and corn starch popularly) available in the Indian market whereas in USA and European

countries more than 100 products are available for the consumers, hence there is a great scope and market potential for the maize based value added products in the Indian market:

- Consumer is becoming more health conscious and aware about dietary intakes and seeking for an alternative to lessen or replace their refined wheat flour intake, for such consumers maize based products can be promising alternative.
- Maize is one of the favorite options for the people, who are sensitive to gluten or suffering with celiac disease, but due to unavailability of maize products in India, they either rely on the imported products or some other grain based products. Thus here again maize based value added products may grab the market of such consumers.
- In India, maize based traditional products like karba, raab, kheech, papdi, dhokla, baati, halwa, goriya, paaniya been prepared at home since the ancient time but these products are not available in the market.
- Maize is cheap grain and can be option for majority of the population belonging to lower income group and can address the problem of malnutrition.

Challenges:

- Machines and equipments particularly designed for maize processing are not easily available.
- Linking maize processing with Renewable energy sources.
- Awareness generation and popularization of maize based products on mass scale.
- Availability of QPM seeds to the farmers and to the market.
- Post harvest losses and storage is been a major challenge.
- To convince the industries and consumers for production as well consumption of maize products [1-15].

Conclusion

Maize (*Zea mays*) is the most commonly consumed coarse cereal in many forms. Traditionally the importance of maize is well recognised in North India especially Rajasthan as well as in some parts of Southern India. Still a major portion of it is used as animal feed. Attempts have been made to commercialize products of this nutrient rich miracle crop especially the QPM, such that its value both in terms of nutrient content and monetary content could be increased. The added value in return would be undoubtedly upgraded the nutritional as well as the economic status of the farming community and the general population.

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