

“CORN” – THE WONDER CEREAL FOR FOOD AND NUTRITIONAL SECURITY

NAMITHA V V¹, Dr. RAJASREE, G²

¹M.Sc. (Agri) student, Agronomy, College of Agriculture,
Kerala Agricultural University, Thrissur, Kerala, India

²Associate Professor (Agronomy), College of Agriculture,
Kerala Agricultural University, Thrissur, Kerala, India

ABSTRACT

Maize is one of the most important food crops in the world and together with rice and wheat, provides at least 30 per cent of the food calories to more than 4.5 billion people in 94 developing countries. Maize is a key crop for food and feed security and income generation for millions of smallholder farmers in sub-Saharan Africa (SSA), Asia and Latin America. Globally maize is known as “Queen of cereals” because it has the highest genetic yield potential among the cereals. Since the availability of land for cultivation is decreasing and there is an increase in population. In order to close these gaps, we have to find an alternative that will provide more output from the available land there by helping to ensure both food and nutritional security. Among the three important staple cereals in the world, the maize is the one with the highest productivity and nutritive value that can save us from this crisis.

Keywords: Corn, Maize, Food, Nutritional Security, Production, Value Addition

INTRODUCTION

Access to quality, nutritious food is fundamental to human existence. It gives us energy and nutrients to grow and develop, to be healthy and active, to move, work, play, think and learn. It is estimated that about 821 million people in the world are facing malnutrition and one in every nine people suffer from chronic under nourishment (FAO, 2018). Under this circumstance it is important to ensure food and nutritional security. Food and nutritional security exist when all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences which is supported by adequate sanitation, health services and care, allowing for a healthy and active life (FAO, 2010).

IMPORTANCE OF MAIZE OR CORN

Maize in India contributes nearly 9 per cent in the national food basket and can generate more than 100 million-man days (Tariq and Iqbal, 2010). Globally it is an important crop and preferred staple food for more than 1 billion people in Sub-Saharan Africa and Latin America, where animal source of protein is not affordable by the common people. Maize is a C4 plant and is one of the most versatile emerging crop having wider adaptability under varied agro climatic conditions. Globally, maize is known as the “queen of cereals”, as it has the highest genetic yield potential among the cereals (Kumar, 2012).

MAIZE TREND OVER YEARS IN INDIA

It is mainly grown as a kharif crop occupying 80 per cent of area under cultivation in this season. There was a gradual increase in area, production and productivity due to the introduction of hybrid varieties and the production has increased more than two times from a mere 8.88 m t (million tons) in 1994-95 to 25.88 m t in 2016-17. There were three important downfalls in maize production during 2002, 2009 and 2015 which shows a negative trend in growth pattern by 15.26 per cent, 5.42 per cent and 6.62 per cent respectively. Over the past years highest ever production (25.89 m t) was during 2017 which shows an increase of 10 per cent growth rate from 2016. The highest growth rate was observed during 2003 which was a rescue to the food production of India from the collapse during 2002 (India Agristat, 2016) (Fig 1)

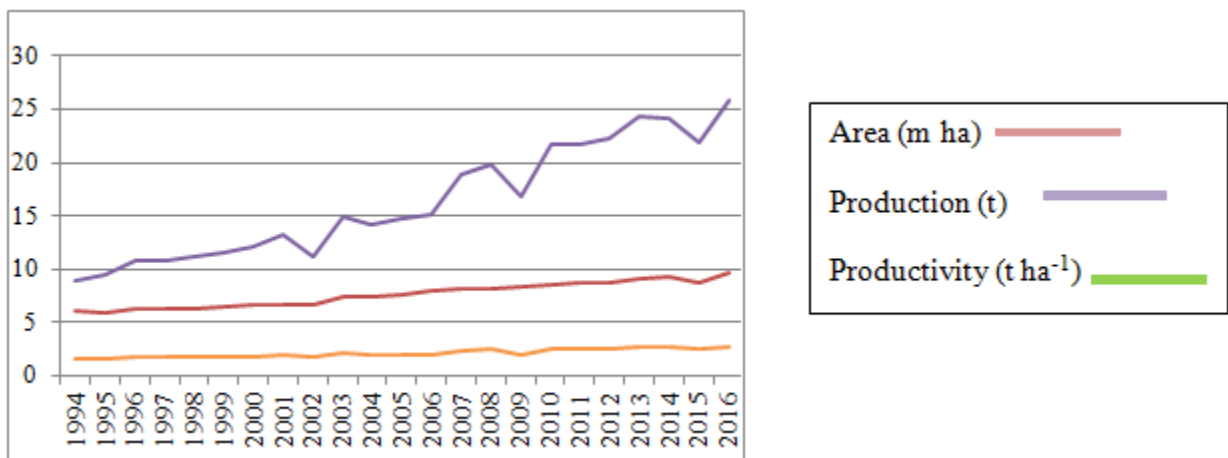


Fig 1: Area, production and productivity of maize in India from 1994-2016

In India all the states are producing maize at varied level. The top maize producing states in India include Maharashtra, Madhya Pradesh, Karnataka, Bihar, Telangana, Andhra Pradesh, Uttar Pradesh, Rajasthan, Tamil Nadu and Gujarat. Maharashtra stands first in production (3.45 m t).

Karnataka has the highest area (1.37 m ha) under cultivation and Andhra Pradesh (6.62 t ha⁻¹) is having highest productivity.

Comparison of the Nutritive value

The comparison of nutritive value of maize, rice and wheat grain is given in Table 1.

| Nutrients | Maize | Rice | Wheat |
|----------------------|-------------|------|-------|
| Energy (Kcal/100gm) | 436 | 457 | 441 |
| Carbohydrate (%) | 81.1 | 74.0 | 74.8 |
| Protein (%) | 12.3 | 11.4 | 8.3 |
| Crude fibre | 1.2 | 2.3 | 0.9 |
| Vitamin B1(mg/100g) | 0.52 | 0.37 | 0.34 |
| Vitamin B2 (mg/100g) | 0.12 | 0.12 | 0.05 |
| Vitamin B3 (mg/100g) | 4.3 | 2.2 | 4.7 |
| Vitamin B6 (mg/100g) | 0.62 | 0.16 | 0.3 |
| Phosphorus (mg/100g) | 210 | 115 | 288 |
| Magnesium (mg/100g) | 127 | 25 | 126 |

Table 1: Corn oil with other commonly used oil in India

| Parameter | Corn oil | Coconut oil | Sunflower oil | Rice bran oil | Mustard oil |
|---------------|----------|-------------|---------------|---------------|-------------|
| Oil content | 7-8 | 50 | 45 | 3 | 34 |
| MUFA | 25 | 6 | 20 | 47 | 60 |
| PUFA | 62 | 2 | 69 | 33 | 21 |
| Saturated fat | 13 | 86 | 11 | 15 | 20 |
| Digestibility | Higher | Higher | Higher | Higher | Lower |

The oil content of the corn oil is less compared to the other commonly used oils, yet it possesses high amount of PUFA and lesser amount of monounsaturated fatty acid (Ambika *et al.*, 2012).

MAIZE FOR VALUE ADDITION

Rather than depending completely on wheat, maize can be mixed along with wheat flour to make composite bread that has more nutritive value than wheat bread as reported by Begum *et al.* (2013). The carbohydrate and energy levels were found to be higher for 25 per cent of maize flour with 75 per cent wheat flour. A mixture of 40 per cent of maize flour with 60 per cent wheat flour produced higher fat and crude fibre content

Shobha (2016) conducted experiment (Table 2) on substituting rice and wheat in breakfast items with that of maize. In Idili when the rice was replaced with maize and black gram in the ratio 3:1 it was found to have more amount of protein, energy, carbohydrate and fat. Dhokla prepared with maize flour was found to have higher protein, energy and carbohydrate content. Kadabu which is prepared with maize and black gram instead of wheat and black gram in the ratio 3:1 also had more carbohydrate, energy and fat content.

Table 2: Nutritive value of breakfast items containing maize flour in comparison with traditional food

| Ingredients | Idili | | Dokla | | Kadabu | |
|---------------------|---------------------|--------------------|-----------------|------------|---------------------|---------------------|
| | Maize:Black gram | Rice:Black gram | Maize: Besan | Rice:Besan | Maize:Black gram | Wheat:Black gram |
| Ratio | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 |
| Protein | 12.45 | 11.84 | 11.42 | 10.01 | 13.54 | 16.74 |
| Carbohydrate | 72.43 | 70.90 | 69.81 | 72.24 | 67.33 | 65.36 |
| Energy | 356.71 | 339.50 | 351.73 | 358.95 | 354.98 | 343.79 |
| Fat | 1.91 | 0.95 | 2.98 | 2.98 | 3.59 | 1.74 |

MAIZE FOR HEALTH

Phytochemicals play an important role in preventing chronic diseases and maize contains major phytochemicals such as carotenoids, phenolic compounds, and phytosterols. It is believed that, maize has an anti-HIV potential due to the presence of Galanthus Nivalis Agglutinin (GNA) lectin or GNA-maize. Decoction of maize silk, roots, leaves, and cob are used against bladder problems, nausea, vomiting, and stomach complaints. “Zein” an alcohol-soluble prolamine, in maize endosperm has novel applications in pharmaceutical and nutraceutical areas. The linoleic acid, regulates blood pressure and cholesterol level and the Phytosterol inhibits cholesterol absorption (Shah *et al.*, 2016).

CONCLUSION

Maize is a potential crop that can address issues like food scarcity, undernutrition which could be grown under adverse climatic conditions. The crop has got diversified uses and has got export potential also. There are a number of value added products which can be prepared for the easy adoption of this crop in our diet. Considering the overall benefits and prospects, maize can be treated as a crop of future, addressing the food and nutritional security of the country.

REFERENCES

- Ambika, R. R., Singh, N., Mahajan, V., Chaudhary, D. P., Sapna, S., and Kumar, R. 2012. Corn Oil: an emerging industrial product. *Am. J. Clin. Nutr.* 44(5): 757 - 763.
- Begum, R., Uddin, M. J., Rahman, M. A., and Islam, M. S. 2013. Comparative study on the development of maize flour based composite bread. *J. Bangladesh Agric. Univ.* 11(1): 133-139.
- FAO [Food and Agricultural organization]. 2010. [on-line]. Available <http://www.fao.org>. [15 Nov. 2011].
- FAO [Food and Agricultural organization]. 2018. [on-line]. Available <http://www.fao.org>. [29 Nov. 2018].
- GOK. 2017. Agricultural Statistics 2015-16, Department of Economics and Statistics, Government of Kerala, 241p.
- India Agristat. 2016. [on-line]. Available: <https://www.indiaagristat.com>
- Kumar, V. 2012. Maize for life. . *Am. Soc. Nutr* 3(2): 13-16
- Shah, T. F., Prasad, K., and Kumar, P. 2016. Maize - a potential source of human nutrition and health: a review. *Cogent. Food Agric.* 2: 1166995.
- Shiferaw, B., Prassana, B. N., Hellin, J., and Bänziger, M. 2011. Crops that feed the world 6. Past successes and future challenges to the role played by maize in global food security. *Food Sec.* 3: 307–327.
- Shobha, D. 2016. Development and evaluation of maize based fermented products. *Am. Soc. Nutr.* 5(8): 110-112
- Tariq, M. and Iqbal, H. 2010. Maize in Pakistan – an Overview. *Kasetsart J. Nat. Sci.* 44(5): 757–763.