

Cultivation Practices Of Quality Protein Maize And Its Importance

K. Naganjali*, K. Shireesha¹, D.Sravanthi¹, K.Gopala Krishna Murthy¹, Kadasiddappa², M.M and J.Hemantha Kumar¹

¹Agricultural College, Aswaraopeta

²Agricultural College, Pallem

Corresponding Author: naganjali_kesipeddy@yahoo.com

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Quality Protein Maize (QPM) refers to a special type of maize (corn) that has a higher protein content compared to regular maize varieties. Regular maize contains proteins that have limited amounts of essential amino acids, specifically lysine and tryptophan, which are important for human nutrition. It is also called as a 'poor man's cereal crop'. It is a result of conventional plant breeding techniques that have been used to increase the levels of these essential amino acids in maize. Because of this, QPM is a more nutrient-dense option, especially in areas where protein shortage is an issue and maize is a major crop. It has been well-researched and has shown positive outcomes in terms of improved nutritional status and health outcomes. Just 1.81 and 0.35% of tryptophan and lysine, respectively, are found in maize proteins, which is significantly less than the Food and Agriculture Organization's (FAO) recommended levels. Tryptophan and lysine, two amino acids that are limited in grains but necessary for humans and other monogastric animals, are almost twice as abundant in its grain.

It was created at the International Maize and Wheat Improvement Center (CIMMYT) in the late 1990s by Surinder Vasal and Evangelina Villegas, for which they were recognized with the 2000 World Food Prize. Maize is the main daily food source for several hundred million people, as well as for weaning infants and feeding cattle. Unfortunately maize (corn) has two significant flaws; it lacks the full range of amino acids, namely lysine and tryptophan, needed to produce proteins, and has its niacin (vitamin B3) bound in an indigestible complex. Nixtamalization, the process of boiling maize in alkaline limewater, was utilized by the Mayans and Aztecs to break down the complex and release the niacin. But neither the Old World nor the immigrants in the "New World" adopted this technique, which led to Pellagra outbreaks starting in the 16th century. Wet-malnutrition is a disorder caused by diets heavy in corn (a person receives enough calories, but their body malfunctions due to a lack of protein). Kwashiorkor is the consequence of a persistent food deficiency in protein. Thus, regular maize is a poor-quality food staple; unless consumed as part of a varied diet i.e beyond the means of most people in the developing world. QPM yields 70–100% more tryptophan and lysine than the most recent tropical maize cultivars. By enabling the body to produce full proteins, these two amino acids help to prevent wet malnutrition. Furthermore, the body can convert tryptophan to niacin, which lowers the likelihood of pellagra.

In order to overcome this problem, QPM has been developed by maize breeder by incorporating opaque-2 mutant gene which is responsible for enhancing the 0₂ essential amino acids. It tastes like ordinary maize with same or higher yield potential. Cultivation practices of QPM are mentioned below:

Soil : It can be grown successfully in wide range of soils ranging from loamy sand to clay. Avoid low-lying fields having poor drainage.

Selection of cultivars: In India a total of 09 cultivars of QPM have been developed. They have different maturity period and grain colour for their cultivation under different agro climatic conditions. The varieties are namely HQPM-7, Vivek QPM 9, HQPM-5, HQPM-1, Shaktiman 4, Shaktiman-3, Shaktiman-2, Shaktiman-1. It is advised to grow single cross hybrids for higher productivity.

Sowing time: It can be grown in all seasons.

Seed rate and spacing: In general 20 kg seed/ha is optimum. Spacing of 60x20 cm.

Nutrient management: For greater yields, apply well-decomposed FYM @ 10t/ha, then 150 kg N, 70 kg P₂O₅, and 70 kg K₂O/ha. Full doses of P, K and Zn @ 25 kg Zn SO₄ /ha should be applied as basal. Nitrogen application should be done in five splits (1.10% N as basal, 2.20% N at 4 leaf stage, 3.30% N at 8 leaf stage, 4.30% N at flowering stage and 10% N at grain filling stage) for higher N use efficiency.

Irrigation: First irrigation should be applied very carefully wherein water should not overflow on the ridges/beds. Young seedling, knee height stage, flowering and grain filling are the most sensitive stages for water stress and irrigation should be ensured at these stages.

Weed management: Weeds are the serious problem in maize, particularly in *Kharif* season that competes with maize for nutrient and causes yield loss upto 35%. Pre-emergence application of Atrazine @ 1.0-1.5 kg a.i./ha in 600 lit water is effective way for control of weeds. One or two hoeing are recommended for aeration and uprooting of the remaining weeds.

Crop protection: Maize stalk borer is major pest during *Kharif* season. It can also be controlled by release of 8 Trichocards per ha at 10-15 days after germination. Many diseases occur in maize particularly in fields which are waterlogged during the pre-flowering stage. Growing resistant varieties and timely sowing are the best ways to avoid those diseases.

Harvesting: It should be done at optimum moisture content (20%) in grain. The harvested cobs should be sun dried before shelling and should be shelled at 13-14% grain moisture to avoid post harvest losses due to stored grain pests and diseases.

Uses: Presence of high amount of lysine and tryptophan and low amount of leucine and Isoleucine in the endosperm has given QPM a special and distinctive status among cereals. QPM can be utilized in diversified ways as infant food, health food, convenience food, specialty food and emergency ration. It is also a nutrient-rich feed for fish, swine, poultry, and other animals. The nutrient-dense goods produced by QPM can take the place of expensive commercial foods.

References:

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