

Chapter 1

The Hidden Wonders of Annatto Seeds: Exploring the Ethnobotanical, Pharmacological, and Chemical Significance

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ABSTRACT

*Annatto seeds are harvested from the evergreen shrub *Bixa orellana* Linn, also known as the annatto plant. The historical and cultural relevance of annatto seeds as a natural source of sauces, colors, and traditional medicines explains its ethnobotanical value. These seeds are important for Native Americans as they use these seeds to dye clothes, food, and their bodies. The phytoconstituents of annatto seeds include apocarotenoids, carotenoids, volatile oils, terpenes, and terpenoids. Bioactive*

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substances like bixin and nor-bixin have excellent antioxidative properties. Annatto seeds have proven antibacterial, anticancer, antifungal, and antidiabetic properties, making them versatile therapeutic agents in modern medicines. Their cultural and historical significance as a natural resource has resulted in improved comprehension of their medicinal potential. The thorough examination of annatto seeds in this work highlights their ongoing significance in the changing fields of ethnobotany and contemporary science and illuminates their wide-ranging applications.

INTRODUCTION

Annatto belongs to the family Bixaceae and is often referred to as *Bixa orellana* L. (Valério, Ramos, Braga Neto, & Macedo, 2015). *Bixa* is the only genus in the Bixaceae family. It consists of five species and the most common is *Bixa orellana*. That is why this genus provokes scientists to investigate. This shrub can be found in central and southern region of America. *Biwa orellana* got its name from Francisco Orellana, the first European who navigated the Amazon. The plant is also the symbol of Amazonian tribes. These tribes utilize seeds of annatto as colored ink to paint different body parts to celebrate their religious rituals. Furthermore, it is a widely circulated myth that cocoa and annatto seeds were components of the first Aztec chocolate drink (Vilar et al., 2014). Initially, annatto dye was known as paprika, and it was utilized to add color to food. Paprika is a popular condiment that adds color to foods. Spanish annatto is produced in Brazil and is stiff, crumbly, and odorless. French annatto is bright yellow. It is hard, fermented in urine, and originated in Guinea. It has a pungent smell (M. Elias, G. Schroth, J. L. Macêdo, M. Mota, & S. A. D'Angelo, 2002).

Annatto is a shade-sensitive plant (M. E. A. Elias, G. Schroth, J. Macêdo, M. Mota, & S. A. D'Angelo, 2002) and gives good yield with sun exposure. It grows best in soil full of nutrients and has a pH range of 5.5-6. It is not easy to find such type of soil which is why minerals and organic fertilizers are important as they can improve the yield of annatto plants. They thrive in the poor soil of the Amazon rainforest. The trees of this family are 3 to 6 meters high. Tree consists of a short trunk with a diameter of 20-30cm (Liao et al., 2020). The bark of the plant is dark grey and its lenticels are arranged in vertical rows. Its leaves are alternate and oval. They have a sharp apex and a broad base shaped like a heart. They range in size from 8 to 20 cm in length and 5 to 12 cm in breadth. Its leaves are arranged spirally with long petioles featuring crimson veins. They are oval in shape, simple, and stipulate. Studies showed that the leaf is dorsoventral and midrib and laminar region covered with cuticle. They act as aldose reductase inhibitor which is why they have antiglycemic, antibacterial, and antihemorrhagic effects. Leaves have bixin

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