



Studies on FYM and Biofertilizer on fruit yield & quality in Aonla [*Emblica officinalis* Gaertn) cv. Chakaiya

(*Ripin, Saket Mishra, Shashi Kant Ekka and Khushi Khandelwal)

Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj

*Corresponding Author's email: ripinkundu@gmail.com

Aonla or Indian gooseberry (*Emblica officinalis* Gaertn. Syn. *Phyllanthus emblica*) belongs to the family Euphorbiaceae, is one of the important indigenous fruits of India subcontinent, known for its medicinal and therapeutic properties and considered as a wonder fruit for health conscious population **Darpreet et al., (2019)**. It is the richest source of vitamin C (400-1300 mg/100 g from pulp) among the fruits next to Barbados cherry (**Mandal et al., 2013**). By nature the plants of aonla are bestowed with some specific characters like intensive and deeper root system, winter dormancy (under north Indian condition) in plants and summer dormancy in fertilized zygote, reduced leaf, area, coincidence of fruit growth and development with moisture availability period (monsoon period) and selective absorption of cations and anions, which makes it suitable to grow in varied agro – climatic and soil conditions of the fragile agro-ecosystem. At present Aonla is being cultivated in an area of about 49.62 thousand ha with annual production of 111.10 thousand metric tones. The rainfed conditions with low and erratic rainfall pattern prevailing in these regions however restricts the growth and development of plant and production from the orchards. Under severe drought conditions; the plants are prone to water stress. In spite of no assurance of irrigation in these regions, the moisture conservation technique is generally not being followed in aonla orchard, which aggravates the problem many folds. Soil moisture and soil temperature are the two most significant factors, which influence the evapo – transpiration, growth, development and biological activity of the plant. In arid and semi arid areas, thermal stress and erratic rainfall create moisture stress in the plant particularly during summer.

Aonla is drought hardy fruit crop which is characterized by deep root system and exhibits deciduous nature due to abscission and shedding of determinate shoot during February and March. The success of aonla cultivation under arid ecosystem is largely based on efficient management of available natural resources. The basic concept of integrated nutrient management is the adjustment of plant nutrient supply to an optimum level for sustaining the desired crop productivity **Aal et al., (2020)**.

Fruit are commercially used for preparation of Chayanprasah, Triphala and hair oil the well known Ayurvedic medicine being a rich source of vitamin C; Aonla is helpful in curing scurvy problems of teeth, gums, eye and stomach. Fresh fruit are also used for the preparation of products such as preserve e (murabha), Pickles, Aonla Candy, squash, Jam, Chutney etc.

Considering the high productivity per unit area, hardy nature, medicinal value and number of uses, there is huge scope for aonla to be one of the most important fruit of 21st century. In the recent year considering its prospects under wasteland conditions, particularly in salt affected soils. The area under aonla cultivation is increasing rapidly day by day. Uttar Pradesh is the major growing state of aonla where its commercial plantation is available

especially in Pratapgarh, Allahabad, Sultanpour, Faizabad, Mirzapur, Kanpur, Etawah and many eastern districts. Aonla is also commercially cultivated in the states of Rajasthan, Maharashtra, Karnataka, Tamil Nadu, Gujarat, Haryana, Punjab and Himachal Pradesh.

For judicious use of manures and fertilizers and balance nutrition to Aonla plant, nutritional diagnosis is of great importance. The aonla tree bears two types of shoot, i.e. short or determinate and long or indeterminate. The indeterminate shoot continues to grow through the season. These shoots, irrespective of their emergence, neither are caducous nor floriferous. The determinate shoots having short internodes emerge from the nodes of these shoots in cluster of 3-5. For the diagnosis of nutrient status in the plant sampling should be done from the middle portion of indeterminate shoots. The status of major essential nutrient has been found to vary with age of shoot particularly in the newly emerged shoots during April and become more or less stabilized when the shoots are 3 months old during July. Only these shoots should be sampled for nutritional diagnosis.



Botanical description of aonla: Aonla or Indian gooseberry (*Emblica officinalis* Gaertn. Syn. *Phyllanthus emblica*) belongs to the family Euphorbiaceae, is one of the important indigenous fruits of India. A small to medium sized deciduous tree, 8-18m in height with crooked trunk and spreading branches. Leaves simple, sub sessile; flower greenish yellow; fruit nearly spherical pale yellow with 6 vertical furrows. Wild or planted throughout the deciduous forests of tropical India and on hill slopes up to 1800M.

Origin: Aonla (*Emblica officinalis*) or Indian gooseberry is indigenous to Indian sub-continent. India ranks first in the world in area and production of this crop.

Economic significance: Aonla is used in the indigenous medicines (Aurvedic system) viz. trifla and chavanprash. Fruits are commonly used for preserve (murabbas), pickles, candy, jelly and jam. Besides fruits, leaves, bark and even seeds are being used for various purposes. Domestic consumers provide major market to aonla.

Effect of FYM on fruit yield and quality: FYM resulted in the highest number of harvested fruits and vitamin C content as well as better growth. The Farm Yard Manure (FYM) seems to be directly responsible in increasing crop yields either by accelerating the respiratory process by increasing cell permeability by hormone growth action or by a combination of all these processes.

Effect of bio-fertilizer on fruit yield and quality (PSB, Azotobacter): Economical and eco-friendly crop production approach warrants the use of biofertilizer. Biofertilizers are like Azotobacter, PSB, Azospirillum, Azolla, substance which contains living microorganisms, they colonize the rhizosphere or the interior of the plant and promote growth by increasing the supply or availability of primary nutrients to the host plant.

PSB: The PSB has highly efficient phosphate solubilizing microorganism (PSM) that grow and secrete organic acids, which dissolve this unavailable phosphate like tricalcium, iron and aluminium phosphates into a soluble form and make it available to the plants

Azotobacter Azotobacter is one of the bio-fertilizer which contains living organisms which when applied on soil surface or seeds help in colonizing the rhizosphere or the interior parts

of the plants parts and also help in promoting growth through the increase of the availability of primary nutrients of plants.

Control of disease

Rust

Disease symptoms: On fruits initially few black pustules appear which later develop in to a ring. The pustules join together and cover big area of the fruit. On leaves, pinkish brown pustules develop which may be arranged in group or scattered as infection of fruit does not go on leaves and vice-versa. Teleospores of *Ravenelia emblicae* causes the fruit and leaf infection Favourable condition is after monsoon in September



Rust on fruits

Rust on leaves

Controls: Spraying with Dithane Z -78 at 0.2% at the interval of 7 to 28 days during the months of July to September proves effective.

Soft rot

Disease symptoms: Smoke brown to black round lesions develop on fruits within 2-3 days of infection. The diseased parts later show olive brown discoloration with water soaked areas extending toward both the ends of fruits forming an eye shaped appearance. Infected fruits become dark brown, crinkled with softening of underlining tissues and get deformed. Fungus causes infection both in young and matures fruits, but mature fruits are found to be more susceptible. Disease is favored by hot and wet weather. The optimum temperature for fungal growth is 29°C and it grows well up to 32°C.



Controls: Treatment with carbendazim or thiophanate methyl 0.1% after harvest. Fruits smeared with mentha oil, checks the rot.

References

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