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## Ritesh Patel

M.Sc. (Horticulture) Scholar,  
Department of Fruit Science, Pt.  
K.L.S. College of Horticulture and  
Research Station (CHRS), Pendri,  
Rajnandgaon, Chhattisgarh, India

## Dr. MS Paikra

Professor and Head, Department  
of Fruit Science, (MGUVV),  
Sankra, Durg, Chhattisgarh, India

## Dr. Dikeshwar Nishad

Assistant Professor, Department of  
Agricultural Statistics, S.K.S.,  
(CARS), Surgi, Rajnandgaon,  
Chhattisgarh, India

## Dr. Sangeeta

Assistant Professor, Department of  
Fruit Science, Pt. KLS, College of  
Horticulture and Research Station,  
Rajnandgaon, MGUVV, Durg,  
Chhattisgarh, India

## Dr. UB Deshmukh

Dean, Pt. KLS, College of  
Horticulture and Research Station,  
Rajnandgaon, MGUVV, Durg,  
Chhattisgarh, India

## Dr. Versha kumari

Assistant Professor, Department of  
Vegetable Science, Pt. KLS College  
of Horticulture and Research  
Station Rajnandgaon, MGUVV  
Durg, Chhattisgarh, India

## Corresponding Author:

### Ritesh Patel

M.Sc. (Horticulture) Scholar,  
Department of Fruit Science, Pt.  
K.L.S. College of Horticulture and  
Research Station (CHRS), Pendri,  
Rajnandgaon, Chhattisgarh, India

## Effect of different pre-sowing seed treatments on germination and seedling growth of aonla cv. NA-7

Ritesh Patel, MS Paikra, Sangeeta, Versha kumari, Dikeshwar Nishad and UB Deshmukh

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### Abstract

The experiment entitled “Effect of different pre-sowing seed treatments on germination and seedling growth of aonla cv. NA-7” was conducted at the Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon (C.G.) during the year 2024-25. The experiment was laid out in Completely Randomized Design (CRD) with 13 treatments. From the present investigation, it was revealed that there was significant influence among different treatments in terms of seed germination and growth parameters of papaya. Among the various treatments, application of T<sub>11</sub>: Dipping in GA<sub>3</sub> (500 ppm) produced the earliest initial emergence (6.10 days), fastest 50% germination (10.56 days), and highest germination percentage (83.78%). Acid scarification and thiourea treatments also significantly enhanced germination compared to the control (which lagged at 15.28 days for emergence, 19.37 days for 50% germination, and 38.94% germination percentage). This reflects the efficiency of chemical regulators in breaking dormancy and promoting rapid, uniform germination.

**Keywords:** Aonla, seed germination, treatment, cultivar, days after sowing

### Introduction

Aonla or Indian gooseberry (*Emblica officinalis* Gaertn.) is one of the most important arid zone and wasteland fruit crop of commercial importance belonging to the family Euphorbiaceae with chromosome number of 2n=28. It is one of the most important minor fruit of Indian origin, which is predicted to be the ‘Fruit of the 21st Century’ even though it existed from time immemorial. It is also called as ‘Indian gooseberry’, ‘Amla’, ‘Nelli’, ‘Amlaki’, ‘Amali’, ‘Ambala’ and ‘Amalakamu’ in different parts of India (Radha and Mathew, 2007) [6]. Aonla is a medium-sized, deciduous tree, known for its hardiness and longevity. It typically attains a height of 8–18 meters and develops a crooked trunk with spreading branches that form a broad, rounded crown. The bark is light grey to greenish-grey in color and exfoliates in irregular flakes, giving the tree a distinctive appearance.

Aonla is known for its medicinal and therapeutic properties from the ancient time and considered as a wonder fruit for health in India. Fruits are highly nutritious and richest source of vitamin C (600mg/100g) among the fruits next to Barbados cherry. The other constituents are polyphenols, ascorbic acid, tannins, gallic acid, ellagic acid, emblicanin A and B, and flavonoids, which impart high antioxidant potential. The pulp contains 70–80% moisture, 0.5–0.7% protein, 0.1–0.5% fat, 14–21% carbohydrates and 3–5% fiber. Along with appreciable quantities of calcium, phosphorus, iron, and other trace minerals. Aonla fruit is having properties like antiscorbulic, diuretic, laxative, and antibiotic used for treating chronic dysentery, diarrhoea, diabetes, dyspepsia, cough, anemia and jaundice. As a result, the fruit has acquired an important therapeutic role in the Ayurvedic and Unani systems of medicine.

India is the world’s leading producer of aonla, with major production across states such as Uttar Pradesh, Maharashtra, Gujarat, Rajasthan, Andhra Pradesh, Karnataka, Tamil Nadu, and Himachal Pradesh. National estimates report about 93,000 hectares under production, yielding approximately 1,090,000 tonnes annually. According to APEDA (2023–24), the top producing states are: Madhya Pradesh: 487,270 tonnes (35.35%), Uttar Pradesh: 425,890 tonnes (30.90%), Tamil Nadu: 208,210 tonnes (15.10%), Gujarat: 69,960 tonnes (5.08%), Chhattisgarh: 40,380

tonnes (2.93%) Followed by Jharkhand, Rajasthan, Assam, Punjab, Maharashtra, etc.

Various chemicals like GA<sub>3</sub>, thiourea, sulphuric acid and cow urine have been reported to influence germination and seedling growth (Rajamanickam *et al.*, 2002) [7]. Availability of quality planting material is the prime need of the day in this cultivar. Therefore, there is a necessity to standardize the techniques for improving germination and seedling growth in aonla.

### Materials and Methods

The experiment was conducted in Completely Randomized Design (CRD) with 13 treatments i.e. T<sub>0</sub> Direct seed sowing (control), T<sub>1</sub> Distil Water soaking for 24 Hrs., T<sub>2</sub> Cold water soaking for 24 Hrs., T<sub>3</sub> Hot water treatment 60°C for 30 sec., T<sub>4</sub> Soaking in Cow urine 10% for 24 Hrs., T<sub>5</sub> Soaking in Cowdung slurry for 24 Hrs., T<sub>6</sub> Dipping in thiourea (1%), T<sub>7</sub> Dipping in thiourea (2%), T<sub>8</sub> Dipping in KNO<sub>3</sub> (1%), T<sub>9</sub> Dipping in KNO<sub>3</sub> (2%), T<sub>10</sub> Scarification by H<sub>2</sub>SO<sub>4</sub> (98%) for 30 Sec., T<sub>11</sub> Dipping in GA<sub>3</sub> (500 ppm), T<sub>12</sub> Dipping in GA<sub>3</sub> (750 ppm).

### Potting mixture

The experiment was carried out by sowing seeds in 20 x 15 cm size polythene bags. The polythene bags were purchased to improve the drainage and filled with potting mixture which was prepared by mixing one parts of soil, one part of vermicompost and one part of sand. The polythene bags were placed in flat beds at proper space.

### Selection of seed

Fresh seeds of aonla fruit “cv. NA-7” were collected from the Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.). Healthy seeds were selected and used for the experiment.

### Sowing of seed

Pre-treated seeds were sown in polythene bags which were properly filled, labelled with tags and placed under Shade net houses during experimentation.

### Irrigation

Regular irrigation was provided to seeds sown in polythene bags using rose cane and maintained the proper moisture level. The bags were watered as and when required.

### After care of the seedling

Weeding was done regularly to keep the polybags free from weeds. Watering was done daily by watering can. No major insect pest and diseases were noticed during the study period.

### Results and Discussion

#### Days required for first seed germination (DAS)

The days required for germination were calculated by subtracting the date of sowing from the date of plumule emergence.

#### Days required for 50% seed germination (DAS)

The number of days taken for 50% germination in all thirteen treatments, the minimum number of days taken to germinate 50% seeds separately in each treatment was recorded.

#### Germination percentage

The germination percentage in each treatment was recorded at 30 days after sowing. Number of seedlings were counted and expressed as germination percentage.

$$\text{Germination percentage} = \frac{\text{Number of germinated seeds} \times 100}{\text{Number of seeds sown}}$$

**Table 1:** Effect of different pre-sowing seed treatments on different parameters of Aonla cv. NA-7

| Notation        | Treatments                                                        | Days required for first seed germination | Days required for 50% seed germination | Germination percentage |
|-----------------|-------------------------------------------------------------------|------------------------------------------|----------------------------------------|------------------------|
| T <sub>0</sub>  | Direct seed sowing (control)                                      | 15.28                                    | 19.37                                  | 38.94(38.59)           |
| T <sub>1</sub>  | Distil Water soaking for 24 Hrs.                                  | 14.10                                    | 18.25                                  | 47.86(43.75)           |
| T <sub>2</sub>  | Cold water soaking for 24 Hrs.                                    | 13.96                                    | 17.24                                  | 48.23(43.96)           |
| T <sub>3</sub>  | Hot water treatment 60°C for 30 sec.                              | 12.30                                    | 16.93                                  | 49.85(44.89)           |
| T <sub>4</sub>  | Soaking in Cow urine 10% for 24 Hrs.                              | 11.59                                    | 15.89                                  | 56.87(48.93)           |
| T <sub>5</sub>  | Soaking in Cowdung slurry for 24 Hrs.                             | 11.97                                    | 16.99                                  | 53.28(46.86)           |
| T <sub>6</sub>  | Dipping in thiourea (1%)                                          | 7.24                                     | 11.04                                  | 80.26(63.61)           |
| T <sub>7</sub>  | Dipping in thiourea (2%)                                          | 9.86                                     | 13.96                                  | 75.48(60.31)           |
| T <sub>8</sub>  | Dipping in KNO <sub>3</sub> (1%)                                  | 10.37                                    | 14.37                                  | 69.97(56.77)           |
| T <sub>9</sub>  | Dipping in KNO <sub>3</sub> (2%)                                  | 11.02                                    | 15.57                                  | 65.22(53.84)           |
| T <sub>10</sub> | Scarification by H <sub>2</sub> SO <sub>4</sub> (98%) for 30 Sec. | 10.79                                    | 14.79                                  | 68.99(56.15)           |
| T <sub>11</sub> | Dipping in GA <sub>3</sub> (500 ppm)                              | 6.10                                     | 10.56                                  | 83.78(66.26)           |
| T <sub>12</sub> | Dipping in GA <sub>3</sub> (750 ppm)                              | 8.53                                     | 12.20                                  | 77.48(61.65)           |
|                 | SE(m)±                                                            | 0.22                                     | 0.29                                   | 1.22                   |
|                 | CD (5%)                                                           | 0.64                                     | 0.86                                   | 3.57                   |

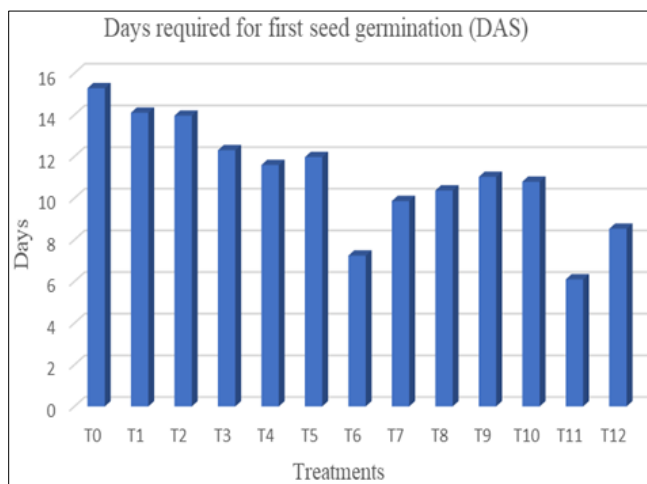


**Fig 1:** Days required for first seed germination (DAS)

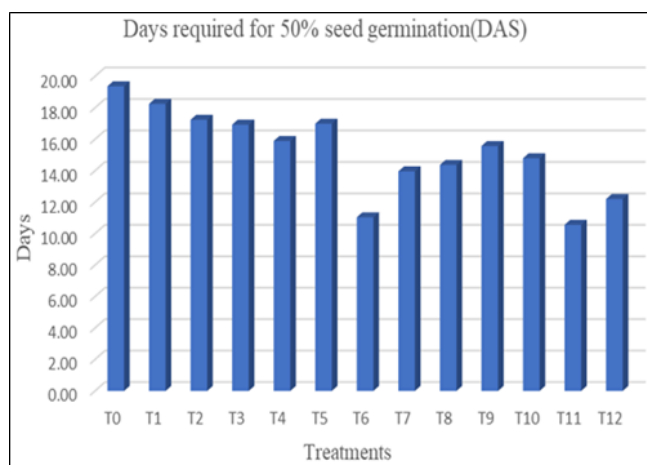


**Fig 2:** Days required for 50% seed germination (DAS)

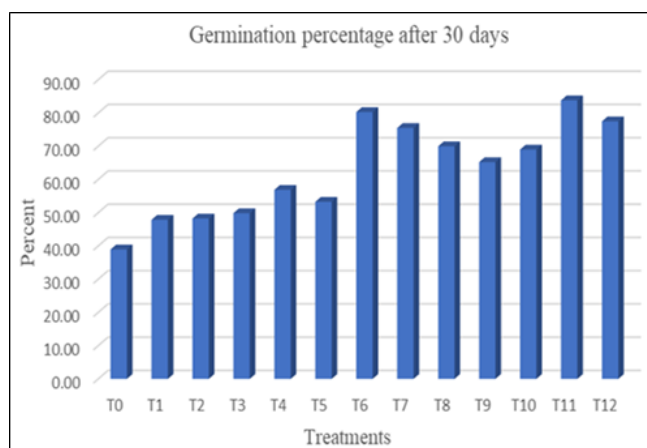


**Fig 3:** Germination percentage

## Conclusion

The conclusion drawn from this research on effect of different seed treatments for Aonla cv. NA-7 highlights the considerable impact of various physical and chemical methods on seed germination and seedling development. Treatments such as dipping seeds in gibberellic acid (GA<sub>3</sub>) at 500 ppm, application of thiourea, and acid scarification were found to significantly accelerate germination by reducing the number of days required for both first emergence and 50% germination. These methods also greatly increased the total germination percentage, uniformity, and subsequent seedling vigour compared to direct

sowing, confirming their role in overcoming dormancy and improving initial seedling establishment.

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