

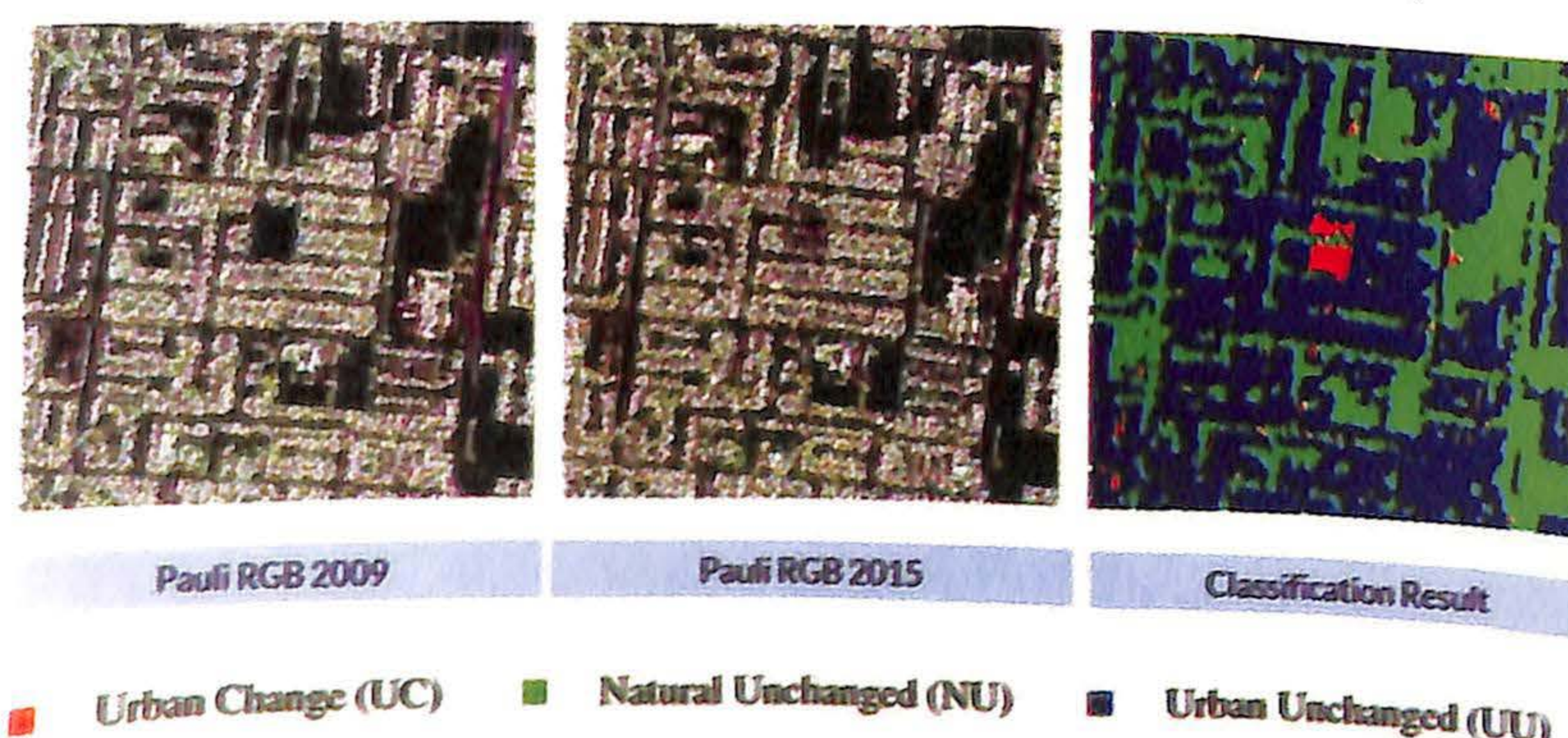
Intelligent Growth Maps for Indian Cities

FOR the many comforts, ease of transport, economic opportunities, and other lifestyle benefits, more and more people are choosing to migrate to cities. The UN estimates that more than 54% of the world's population, that is over 3.8 billion people, live in urban areas in 2017. This number will grow rapidly in the future.

With so many cities coming up, often government censuses, which happen once a decade, are too slow to be able to track the growth and estimate the needs of such large, concentrated populations of people. A solution to track uncontrolled urban growth or sprawl is to use satellite imagery. However, for tropical countries like India, this is not a practical solution as optical satellite imaging is blocked by clouds that are persistent in the rainy seasons. Advanced radar satellites can be used, however, it can be challenging to identify urban areas with these satellites.

Dr. Shaunak De and Dr. Avik Bhattacharya at the Microwave Remote Sensing Lab, Indian Institute of Technology Bombay have discovered a technique by which even challenging urban settlements can be correctly identified. This was done by teaching an artificial intelligence algorithm the physics of radar scattering, much like you would teach a human expert!

They trained an advanced machine learning technique called "Deep Learning" to understand the physics



of radar scattering. To do this, they modeled various common urban buildings and observed what kind of radar scatter is obtained from them. Then they trained a machine-learning algorithm to be able to identify these targets. Much like you would teach a human to find objects, the algorithm was shown examples of different buildings in different orientations, along with examples of things that are not buildings. Slowly, it learned to identify buildings and separate them from forests and other target types.

The novel algorithm has extracted human analyst-like performance in identification of urban areas and detection of changes in urban areas. This is very useful for monitoring sprawl in cities, construction, destruction of urban areas, etc. Using this algorithm it is possible to quickly identify damaged urban areas in cases of natural disasters like floods and hurricanes where traditional satellite imagery would be futile because of the cloud cover.

With upcoming spacecraft like the joint NASA-ISRO NISAR satellite, which will gather enormous amounts of radar data of Earth's surface, such techniques are of paramount importance. It will be impossible to manually search through all that data. Thus, advanced artificial algorithm techniques can help quickly scan through the data, and identify urban areas and map them. Armed with growth maps urban planners can then help make better policy and governance decisions. In case of a disaster in the urban area, they can also come up with rapid mitigation strategies.

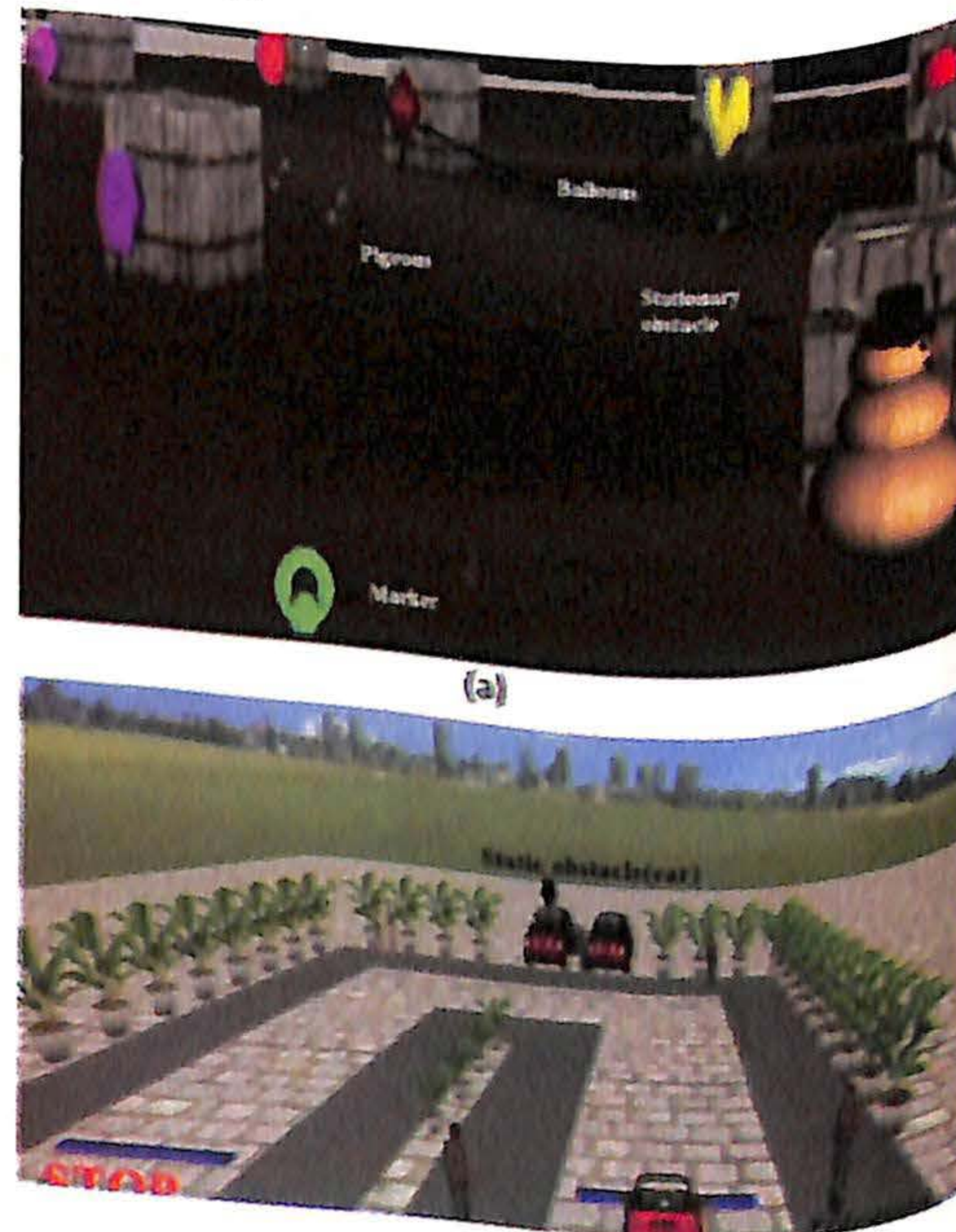
The researchers have published their findings in various journals including *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* (2017).

Augmented Video Games can Help in Stroke Recovery

VIDEO games, popular among kids in the 1990s, have made a comeback with the advent of Virtual Reality (VR) which gives users a sense of touch when augmented with add-on instruments. A group of Indian engineers and neuroscientists has put these advances to use in a field which is not entertainment – recovery of stroke patients.

The technique developed by a group of researchers at the Indian Institute of Technology, Gandhinagar, is a computer-based exercise platform augmented with a feeling of touch. It is a performance-sensitive platform that can intelligently adapt itself as per the performance of patients.

The software of the platform consists of 48 templates of VR-based 'reaching' and 'coordination' tasks that trigger abduction and adduction movements of the shoulder joints as prescribed in physiotherapy guidelines. These tasks in the video game have three difficulty levels to suit the severity of stroke. The hardware interface consists of a haptic stylus that provides tactile feedback to users. In addition, the platform has modules for task switching and physiological data acquisition.



The video game tasks appear to be similar to what kids play but they have been designed for a specific purpose for stroke patients. For instance, the car navigation task requires users to tackle dynamic obstacles like a pedestrian crossing the road as well as static obstacles like tree pots at the edge of the road. This is a coordination task, designed for abduction movement of the shoulder joint. Similarly, 'reaching' task where participants have to puncture balloons, avoiding dynamic and static obstacles, is supposed to spur adduction movement. The technique has been tested in a set of six patients with chronic stroke and has been found to be effective. The research results have been published in *Computer Animation and Virtual Worlds*.

"Unilateral shoulder abduction and adduction are essential for performing daily activities. In our experimental setup, while stroke patients interacted with our VR-based tasks, we recorded their physiological signals in a synchronised manner. Results indicate the potential of using this adaptive and individualised system in persons who had a stroke suffering from upper limb movement disorders," explained Dr. Uttama Lahiri of IIT Gandhinagar, who led the team, while speaking to *India Science Wire*.

The researchers said the system can deliver real-time feedback on one's skill progress. The patients in the study interacted with the system for 30 minutes a day for a week. Results indicated that their performance improved in terms of better scores, reduced task completion time and reduced performance errors.

"Computer game-assisted upper limb recovery seems to be a novel method for assisting recovery of brain functions after stroke. Such game-based recovery may help in precise motor unit activation which makes recovery rational and task-oriented," commented Dr. Vijaya Nath Mishra, a stroke specialist at the Sir Sunderlal Hospital, Banaras Hindu University, who is not connected with the study. However, he said, cost and affordability factors would have to be addressed for the new system to become a useful intervention.

Dinesh C. Sharma, *India Science Wire*

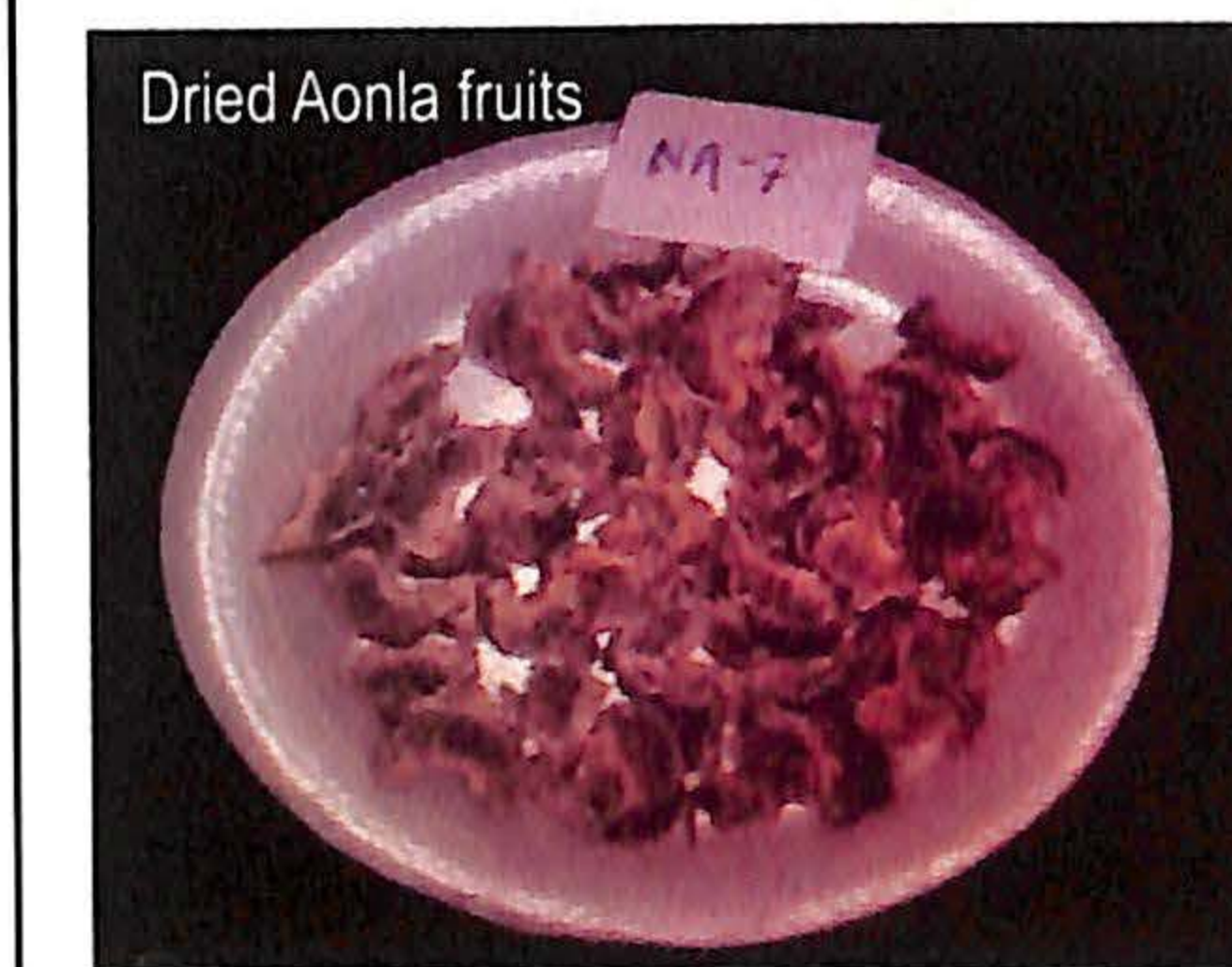
Marketing Dropped Aonla Fruits

EVERY morning in our Aonla orchard, we find the ground under Aonla tree canopy layered by several small-sized Aonla fruits. Can these tiny marbles fetch a good price in the market?

Aonla is also known as Indian Gooseberry and its scientific name is *Emblica officinalis*. It has a high medicinal value. The fruits are the richest source of vitamin C (700mg/100gm of fruits). Aonla fruit having sour and astringent taste is generally utilised raw, cooked or in the form of pickle. Preserves, juice, jam, cheese, candy, powder, beverage, laddoo, burfee, chutney are the different types of aonla products available in the market.

Ayurvedic medicines like Chyavanprash, Triphala churna, Brahma rasayan and Madhumegha churna contain Aonla as an essential ingredient. The fruit is valued as an antiscorbutic, diuretic, laxative, antibiotic and antidysenteric too. Phyllemblin, obtained from the fruit pulp, has been found to have a mild depressant action on the central nervous system. It has very good demand in industries for the preparation of various health-care products also like hair oils, dye, shampoo, face creams and tooth powders.

Aonla if collected at different stages at regular intervals and stored separately can be marketed. The dropped fruits can be collected right from the pea stage. The undamaged fruits are collected in gunny bags, dried under the sun and powdered. The fruits upto one and the half month after fruit set can be ground directly after drying as they have very soft seed. In later stages, the fruits are deseeded for powder preparation.



The powder obtained from the initial stages upto three months is dark in colour and smooth in texture. This dark colour is due to the presence of high phenolic compounds (140-150mg/100g) – these fruits are low in ascorbic acid (150-160mg/100g). These phenolic compounds are the major constituents of cosmetic products like shampoo, conditioners, disinfectants, food and health products, resins, etc. They can be marketed separately to industries.

The fruits obtained during the later stages i.e. after three months till the final harvest stage, are fibrous, rich in ascorbic acid (580-590mg/100g) and low in phenols (25-30mg/100g). These fruits can be collected, cleaned, deseeded, powdered and marketed. The fruit powder can be used in several edible products like chyavanprash, triphala churna, Ayurvedic health tonics, etc. The fruits fetch premium prices as that of the mature fruit powder.

Farmers can benefit by the adoption of this technique of marketing the dropped Aonla fruits at different stages of growth with higher benefits.

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