

# The Institute of Nuclear Agriculture in Bangladesh

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by A K. Kaul

Agriculture is the major factor of the Bangladesh economy, with farm products accounting for about 55 percent of the nation's gross domestic product. To keep pace with the nearly 3 percent annual growth of its population, agricultural productivity in Bangladesh must be substantially increased in the coming years. The establishment of the Institute of Nuclear Agriculture (INA) demonstrates the Government's intention to use modern technology to improve food production. INA is located on the campus of the Bangladesh Agricultural University at Mymensingh, which is about 120 kilometres from Dacca. The INA building consists of two large floors of fully air-conditioned laboratories, a workshop, a library, a cobalt-60 irradiation room, greenhouses, net houses, a modern seed store and 30 acres of experimental farm. The Institute, headed by Dr. Mohatazuddin Mia, has a professional staff of approximately 40 scientists in various fields of agriculture. The Institute complements the research facilities available at the Agricultural University and assists in teaching programmes as well.

Since as early as 1964, a small group of agricultural scientists of the Bangladesh Atomic Research Establishment have been using radioisotopes and radiation tools in their research. Realizing the potential use of nuclear tools in agriculture, this agricultural section was reorganized and expanded into a full-fledge institute. For this work the need for outside support was foreseen and in July 1973 the Government submitted a request for support from the Swedish International Development Agency (SIDA). As a result, a technical assistance SIDA project was approved, with the IAEA being the executing agency. This US \$1 million, 5 year-project provides for some 100 man-months of international expertise, some 200 man-months of fellowships, as well as for various equipment and supplies. The Institute of Nuclear Agriculture was formally inaugurated on 12 December 1977, by the Vice-President of the People's Republic of Bangladesh, Justice Abdus Sattar. Helio F.S. Bittencourt, the IAEA Deputy Director General for Technical Assistance and Publications, represented the Agency at this ceremony.

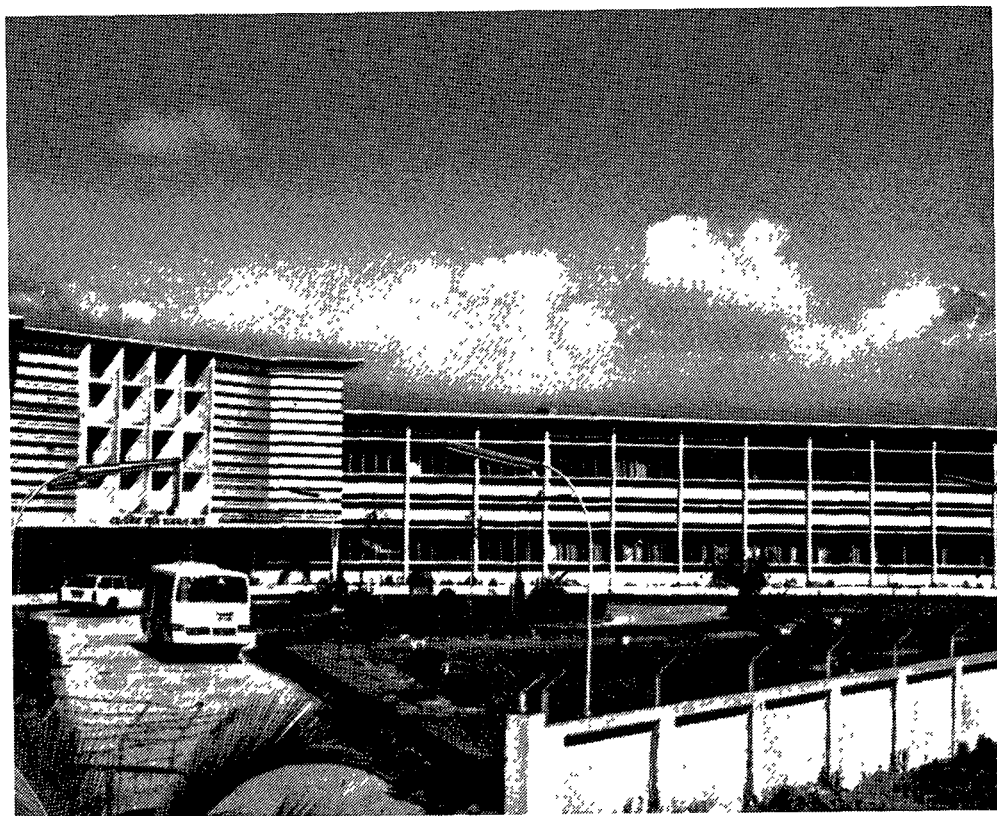
## **Aims and Objectives**

The objectives of INA are:

1. To identify and solve basic agricultural problems of the country through inter-disciplinary approach, employing both nuclear and conventional research techniques.
2. To train scientists in appropriate fields of research at home and abroad, thereby filling the gap of skilled manpower.
3. To conduct experiments in areas of agricultural research, such as breeding of cereals, fibre crops, legumes and oil-seed plants, irrigation and water management, soil-plant relationship studies and other related areas.

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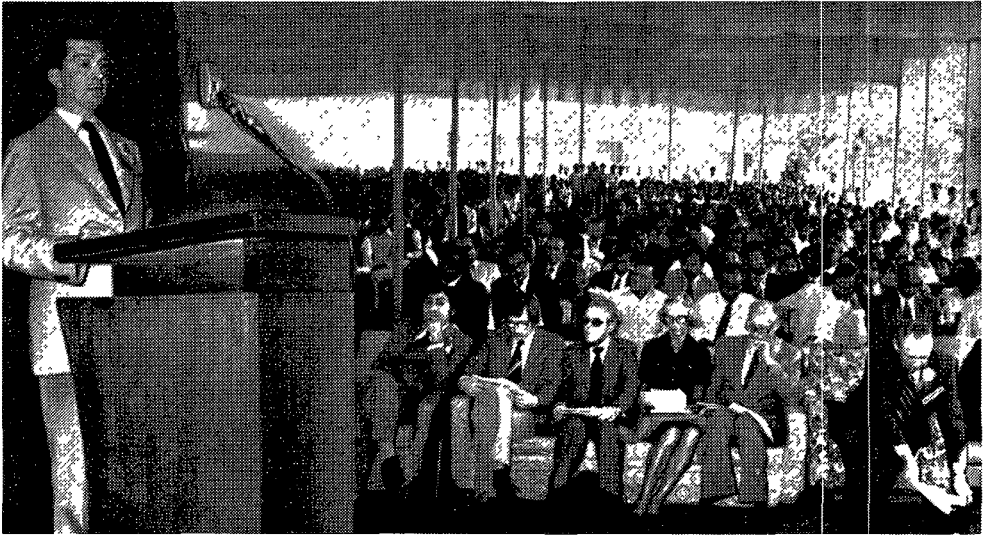


The Institute of Nuclear Agriculture building on the campus of the Bangladesh Agricultural University at Mymensingh.

4. To perfect and apply a number of analytical techniques, which are rapid and accurate, for use in different fields of research. The physical facilities are made available to users from throughout the country.
5. To make use of international expertise in specific fields to provide on-the-spot analysis of problems, and to render advice and training to Bangladesh colleagues.

#### **Present Activities and Future Goals**

At the present time, major efforts are being made in the areas of plant breeding, soil-plant relationship, nutritional quality evaluation of cereals and legumes, water management practices and insect-pest management. The research programmes are organized around problems and not disciplines. INA works in close co-operation with: Bangladesh Agriculture University, Bangladesh Agricultural Research Council, Bangladesh Agricultural Research Institute and other national agricultural research institutes. The Institute is now physically fully established. The necessary manpower is employed and being trained, locally as well as abroad, to meet the future needs. In the near future, important contributions in the fields of legumes and oil-seed improvement and soil-plant relationship are imminent. Systematic screening of soil and plant resources could contribute immensely to the inventory of natural resources and thus to the well-being of the rural masses.



Inaugural ceremony of the Bangladesh INA addressed by Helio F S Bittencourt, IAEA Deputy Director General, Technical Assistance and Publications, who noted that the application of nuclear techniques was by no means a luxury for developing countries but rather a practical method for solving certain agricultural problems

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The INA has its own electronics workshop for the repair of equipment.





Analysis of the oil content of oilseeds is carried out with a nuclear magnetic resonance (NMR) machine at the Institute.

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Test patches of mungbean mutant, M-36, which is resistant to mosaic disease.






Jute variety, C-38, (tall stand on left) and its mother variety, D-154, (right). The C-38 mutant has already been distributed to local cultivators.

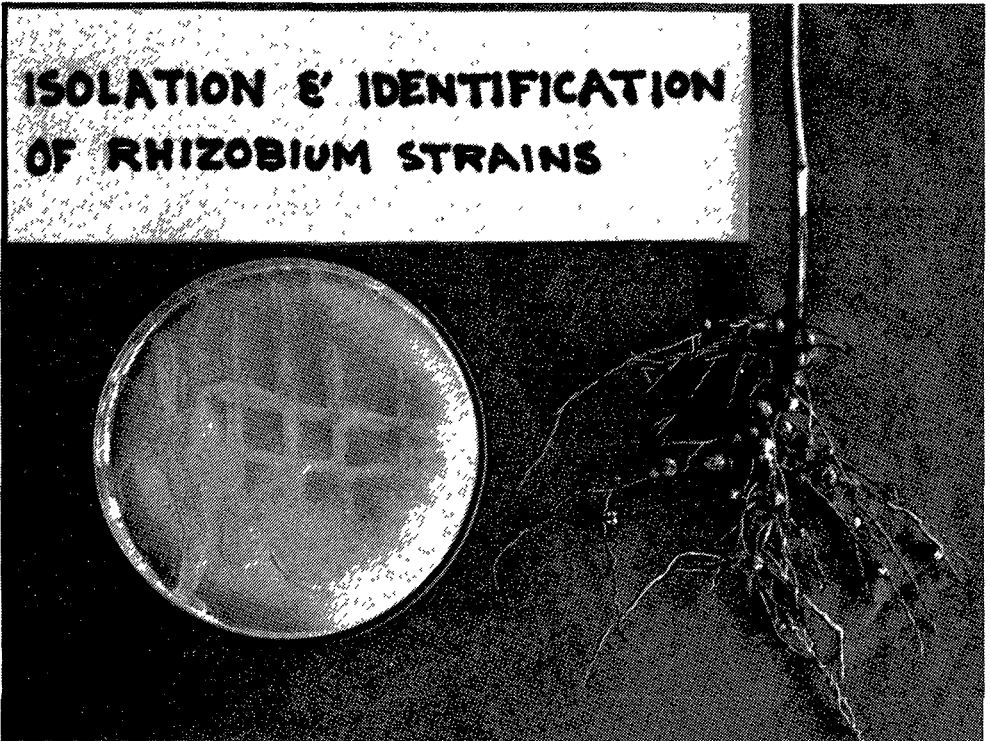
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Time-sowing experiments with a collection of mungbean variants. 

Rhizobia strains (bacteria which live symbiotically in nodules on the roots of legumes and which fix atmospheric nitrogen) are being isolated and identified from all important grain legumes grown in Bangladesh. 



## **ISOLATION & IDENTIFICATION OF RHIZOBIUM STRAINS**







INA has produced a new rice variety, IRATOM-24, through irradiation techniques from the mother variety IRRI-8.

In the field of fertilizer use and soil analysis, apart from participating in national co-ordinated studies, INA scientists are engaged in systematic physico-chemical characterization of soil samples collected from numerous locations in Bangladesh. Rapid screening tools, such as the atomic absorption spectrophotometer, are being used for this purpose. To study soil-plant relationships in depth, plant breeders, soil scientists, and plant physiologists are formulating joint programmes. Fertilizer trials, using both radioactive and non-radioactive material, are being conducted with mutants and newly introduced cultivars. An ambitious programme related to biological fixation of atmospheric nitrogen is being considered.

Eradication of malnutrition and undernutrition in the rural dietary is an important goal of Bangladesh agricultural research, and a strong programme has been started to improve the protein content and quality of cereals and legumes. A programme to improve the oil content and quality of oil seeds has also been initiated. Rapid and sophisticated tools, including a pulsed nuclear magnetic resonance (NMR) machine for oil analysis, are being used for the purpose. Some of the promising high-quality lines of rice, chickpea, beans (*Phaseolus*), mustard and groundnut are being grown at various locations to test their climatological and edaphic adaptability.



Neutron moisture meter is being used by INA to study irrigation requirements of wheat.

It is noteworthy that two mutant varieties of rice, namely IRATOM-38, IRATOM-24, three mutants of jute, namely C-8, C-36 and C-38 and one mutant of tomato, 'Anobik', are already in the hands of cultivators.

INA's activities are not confined to institute laboratories, university lecture theatres and experimental fields. A nearby village has been adopted as a field laboratory to bring science to the grass root level. This unique approach has proved very rewarding in bringing the peaceful uses of nuclear energy to the doorstep of the rural community.