What is Technology Education

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One may wonder what is special about technology education, as most methods in education are quite well known, and the teachers and curriculum developers are well aware of these. Although, the basic principles evolved have a Western origin such as Bloom's taxonomy, learning theories of Skinner, Gagne and Levin, there are much older yet similar methods developed in the East. We also have newer approaches proposed by the developing world as propounded in 'The pedagogy of the oppressed' by Paulo Friere in Brazil.

Despite all these theories and experiments, one can see a dearth in technology development in the poor countries. We need to ask what has failed in technology education to keep the developing countries on a perpetual treadmill of 'development'. It is quite possible that the technology we are teaching is so divorced from reality that 'technology education' has lost all its meaning to our society and culture. While we incorporate new methods of bringing technology to the student through activity rooms etc., we need to ask the question 'what technology?'

What is the most practiced technology in the country? We may find it embarrassing to say agriculture, as we tend to assume that agriculture has no technology content. This is the type of divide we need to overcome if technology education is to have any relevance. This type of compartmentalization creates an additional problem of early specialization into biology and engineering and ultimately to dead-ends in a country like ours. The educated either migrates or says there are no jobs. We see this clearly if we look at some of the most innovative local products now marketed such the "Odiris' *hiramane*" and very soon, a cashew shelling machine which were developed by people who did not get a 'technology education'.

To make any impact of technology on the student, the student must get a chance to apply what he learns to things around him. That is the only way he could combine the perceptual and conceptual acquisition of knowledge, in one go, as proposed by Piaget, and not in two steps as proposed by Descartes. The latter is most like to happen in two stages in life and in two different countries, in our case. The science and its rationality have made the young fight shy of trial and error, and therefore he lacks *praxis*, as a result of his education. In teaching technology, one has to bear in mind what De Vore said "technology is not merely applied science but an enterprise in the context of a given society linked to the cultural paradigm'.

The larger ramifications of technology, too, must be taught to the student at an early stage so that he would look at man's needs first before meeting his unending 'wants'. Professor of Mechanical Engineering at Queen's Mary College, Prof. M. Thring, expressed a sentiment that was very similar to the one attributed to Gandhi a long time ago, when he said " a society that bases its measurements of success solely on the acquisition of status symbols must be self-destructive because there are not enough resources to last for ever". So, the technology education, we are embarking on, should have this attitudinal change built into its mode of delivery.

WHAT IS TECHNOLOGY?

1. IT IS A COMMODITY THAT IS MARKETABLE

2. IT IS PROTECTED BY PROPERTY RIGHTS

3. UNLIKE SCIENCE IT IS NOT UNIVERSAL, AND IS OFTEN CULTURE SPECIFIC.

4. IT IS NOT MERELY A PHYSICAL TOOL BUT A FACILITATOR

5. IT CONCEPTUALLY CONSISTS OF FOUR OPERATIONAL COMPONENTS –

   A. FACILITIES (OR TECHNOLOGICAL HARDWARE)

   B. ABILITIES (OR OPERATIONAL SKILLS)

   C. FACTS (OR INFORMATION AND FACTS)

   D. FRAMEWORK (OR ORGANISATION)

AN INNOVATION CAN TAKE PLACE IN ANY OF THESE FOUR COMPONENTS OF TECHNOLOGY.

DEFINITIONS GIVEN IN THE OSLO MANUAL OF 1992

TECHNOLOGICAL INNOVATION- COMPRISES NEW PRODUCTS AND PROCESS AND SIGNIFICANT TECHNOLOGICAL CHANGES OF PRODUCTS AND PROCESSES. AN INNOVATION HAS BEEN IMPLEMENTED IF IT HAS BEEN INTRODUCED ON THE MARKET, OR USED WITHIN A PRODUCTION PROCESS.

MAJOR PRODUCT INNOVATION — IS A PRODUCT WHOSE INTENDED USE, PERFORMANCE CHARACTERISTICS, ATTRIBUTES, DESIGN PROPERTIES OR USE OF MATERIALS AND COMPONENTS DIFFER SIGNIFICANTLY COMPARED WITH THE PREVIOUS PRODUCTS.

INCREMENTAL PRODUCT INNOVATION — IS AN EXISTING PRODUCT WHOSE PERFORMANCE HAS BEEN SIGNIFICANTLY ENHANCED OR UPGRADED. HERE A SIMPLE PRODUCT MAY BE IMPROVED THROUGH USE OF HIGHER PERFORMANCE COMPONENTS OR MATERIALS OR A COMPLEX PRODUCT, WHICH CONSISTS OF A NUMBER OF INTEGRATED TECHNICAL SUB-SYSTEMS THAT MAY BE IMPROVED BY PARTIAL CHANGES TO ONE OF THE SUB-SYSTEMS.

PROCESS INNOVATION — IS THE ADOPTION OF A NEW OR SIGNIFICANTLY IMPROVED PRODUCTION METHOD. THIS MAY INVOLVE CHANGES IN EQUIPMENT OR PRODUCTION ORGANISATION OR BOTH.

R & D and Commercialization of Research Findings

Flow Chart

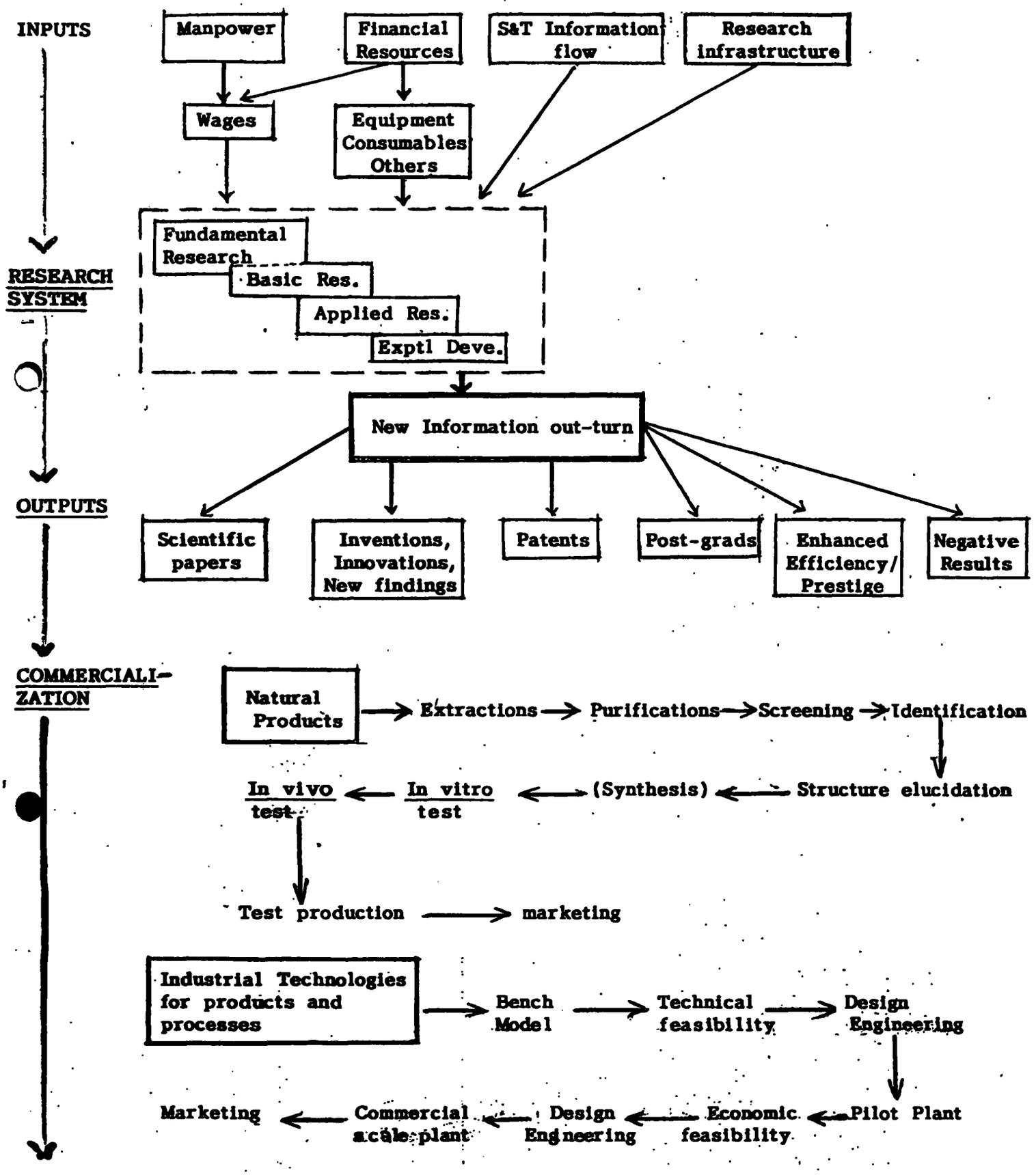

Figure 2.4: THE FOLLOW THROUGH FLOW CHART FROM R & D TO COMMERCIALISATION OF RESEARCH

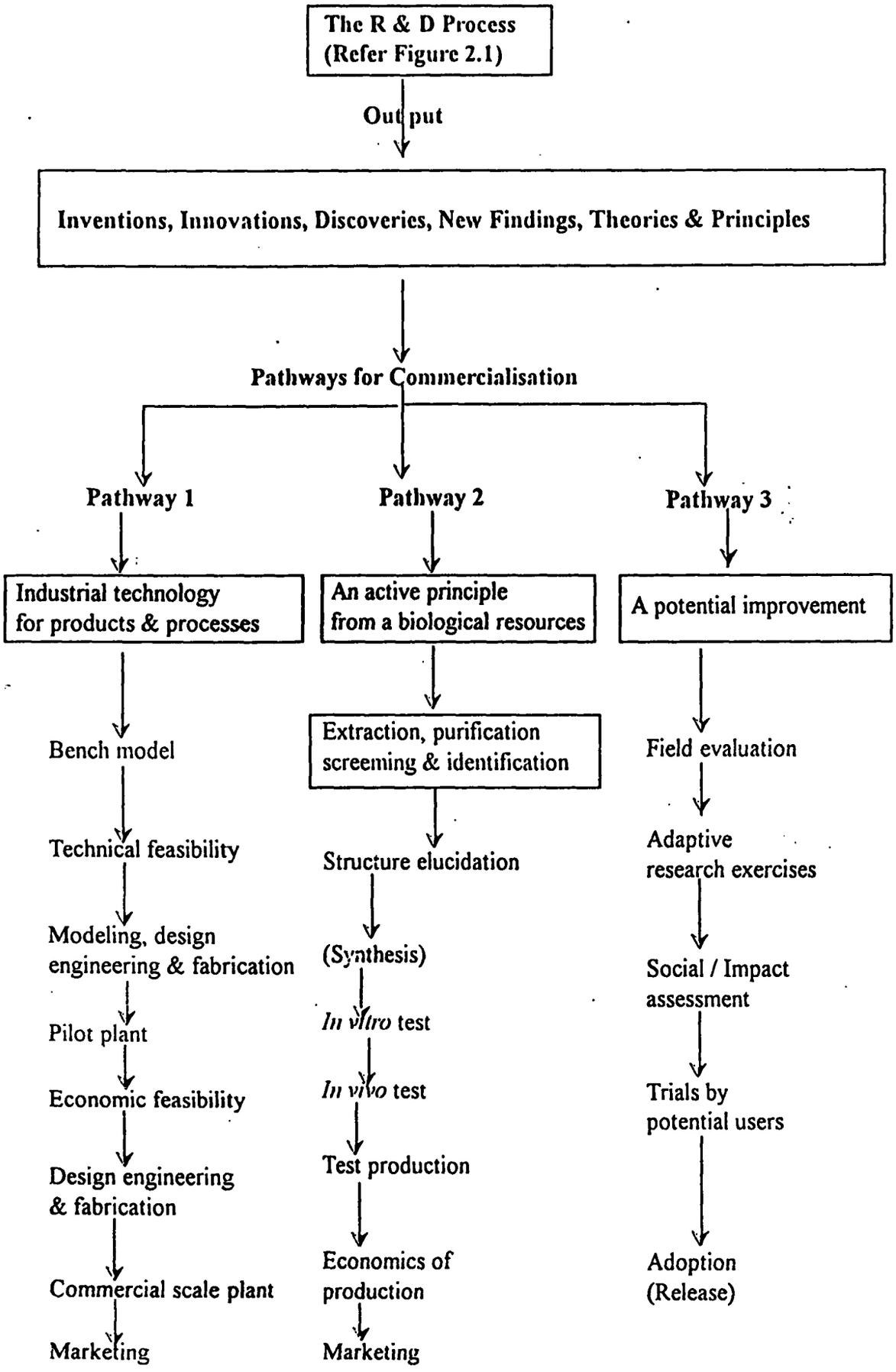

Figure 3 – INNOVATIONS IN THE RICE BREEDING PROGRAMME
(1950 – 1980)

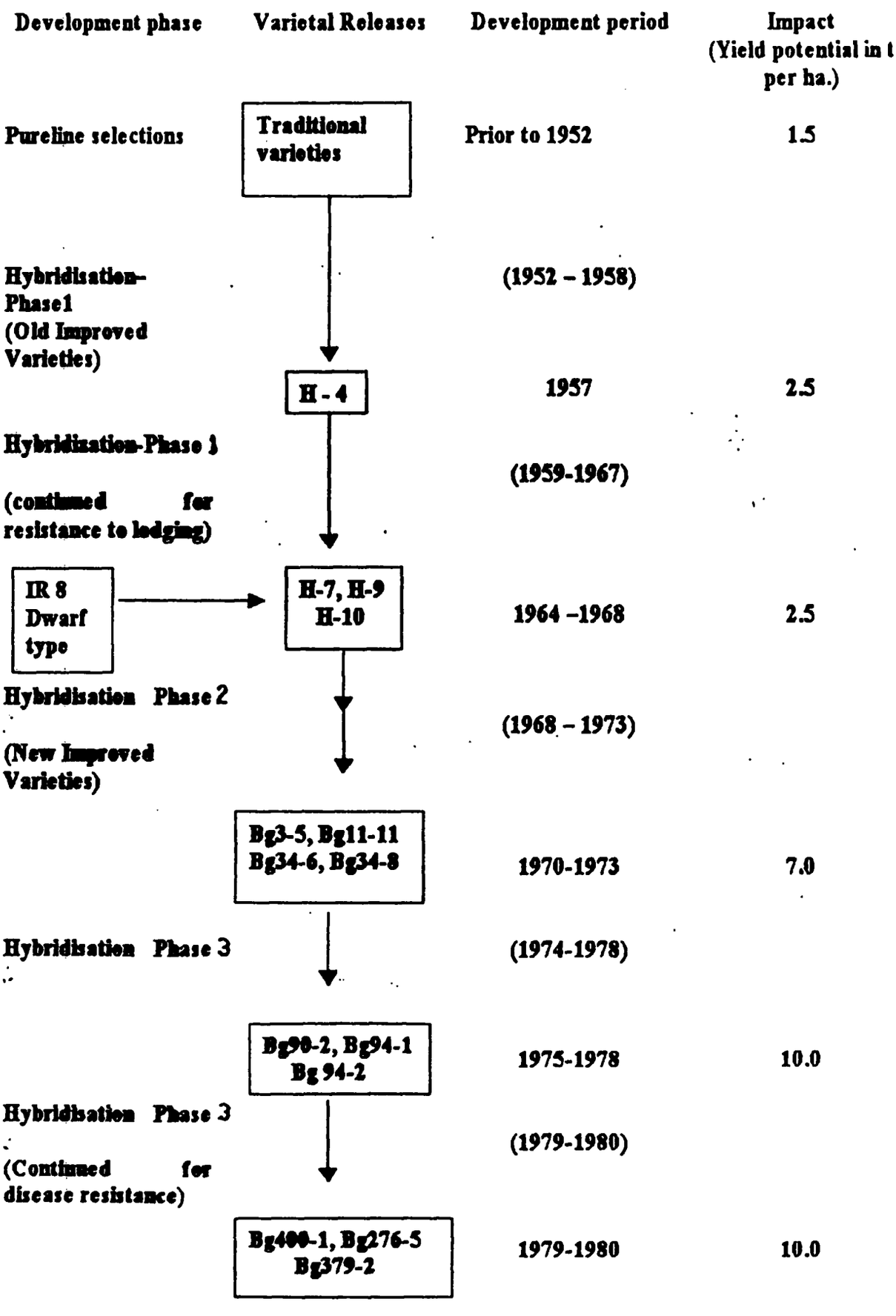

Figure 4 – INNOVATION PROCESS AND TECHNICAL CHANGE FOR THE GREEN REVOLUTION