AGRICULTURE CANNOT WAIT*

DR. M. S. SWAMINATHAN

Director-General, Indian Council of Agricultural Research

BEFORE 1947, the quantum of effort generated in agricultural research and education was microscopic in relation to the magnitude and diversity of the problems awaiting solution although as early as in 1928 the Royal Commission on Agriculture had laid considerable stress on harnessing science to develop and spread new technologies for the arid, semi-arid and irrigated areas. The Indian Council of Agricultural Research established in 1929 was itself an outcome of a recommendation of the Royal Commission. Nevertheless, the Council had neither the authority nor the resources to effectively stimulate and coordinate agricultural research and education in the entire country. Agricultural education enjoyed low social status because of the widespread prevalence of the view that agriculture was a profession needing only brawn and not brain. That is why Mahatma Gandhi attached so much importance to ending the divorce between intellect and labour in rural areas. As a result of the poor social status attached to agriculture as well as the poor returns and high instability of income observed in farming, only students who could not get admission in other professional courses like medicine and engineering as well as in honours courses in science and arts usually tended to gravitate towards agricultural colleges. The manpower of agricultural departments was hence generally inadequate both qualitatively and quantitatively for facing successfully the numerous complex problems posed by the wide range of agro-climatic and socio-ecological conditions met with in the country.

What work was done prior to Independence in our research laboratories seldom found widespread adoption in the field, either because arrangements were not made for the production and distribution of inputs like seeds, pesticides and fertilisers and/or because of very poor extension services. The extension worker by and large had very little to extend either by way of knowledge or of inputs and therefore became an object of ridicule and condemnation. The research workers were also condemned frequently as 'ivory tower' scientists with little concern for the welfare of the farmer. Even as recently as ten years ago, the view that what the country needed was not more research but only extension of the known results of research was widely held. Thus, when India became independent we had inherited an agricultural research and education system which had neither the social prestige nor the self-confidence essential for helping to transform the agrarian economy. It is in this context that the call given by the late Shri Jawaharlal Nehru that "agriculture cannot wait" became so significant in ushering in a new perspective for agricultural growth.

Just before we became independent we had witnessed a great human tragedy in the form of the Bengal Famine. Famines had been a recurrent theme in our national history for a long time and it is, therefore, not surprising that Shri Jawaharlal Nehru announced that one of the first tasks of independent India would be the development of a viable and productive agricultural economy leading to self-sufficiency in our food requirements. Several steps were taken to give effect to this resolve and during the period 1947 to 1960 much progress was seen in infra-structure development through the community development and other programmes. The infra-structure development made it possible for scientific results to strike roots and bear fruit quickly when they started becoming available in more relevant forms during the last twelve years. An index of governmental interest in agricultural research and education can be found from figures concerning the funds made available to the Indian Council of Agricultural Research for work in these fields (Figs. 1 and 2). Today, we have 23 well-equipped and well-staffed research institutions all over the country directly supported by ICAR. In addition, there are 8 soil conservation research centres. We have 19 Agricultural Universities with nearly all States having one Agricultural University each and Maharashtra having four such Universities. Through the All-India Coordinated Research Projects of ICAR an excellent machinery has been created for integrated research on all problems of national importance in agriculture, animal husbandry and fisheries. There are 69 such projects currenly under operation and a unique feature of these projects is that they provide a mechanism for bringing together scientists working in different disciplines and under different administrative hierarchies into a common working family. Above all, the most important strength of our agricultural research

* Issued by Publicity & Public Relations Unit, Indian Council of Agricultural Research, Krishi Bhavan, New Delhi-1.

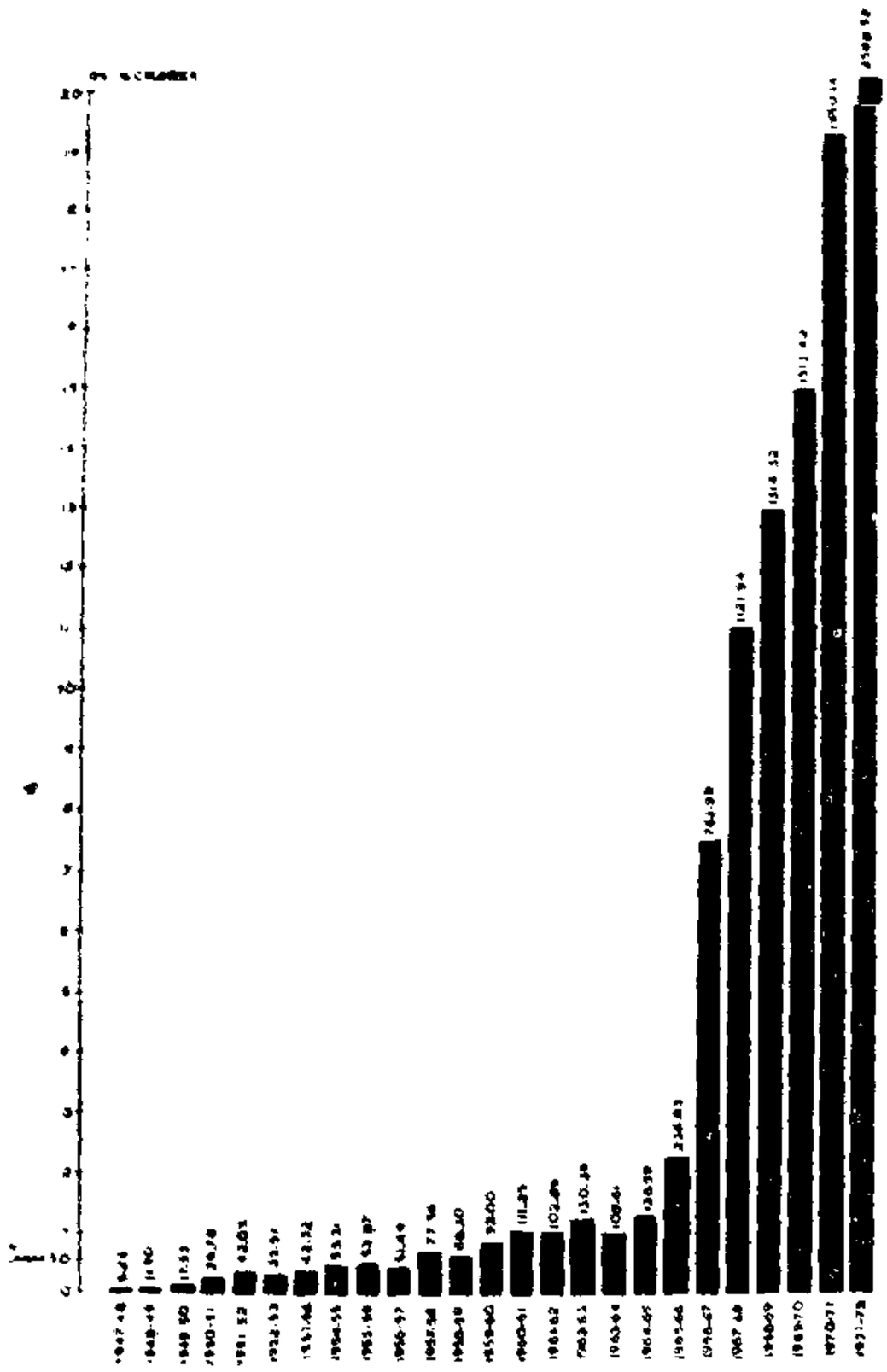

FIG. 1

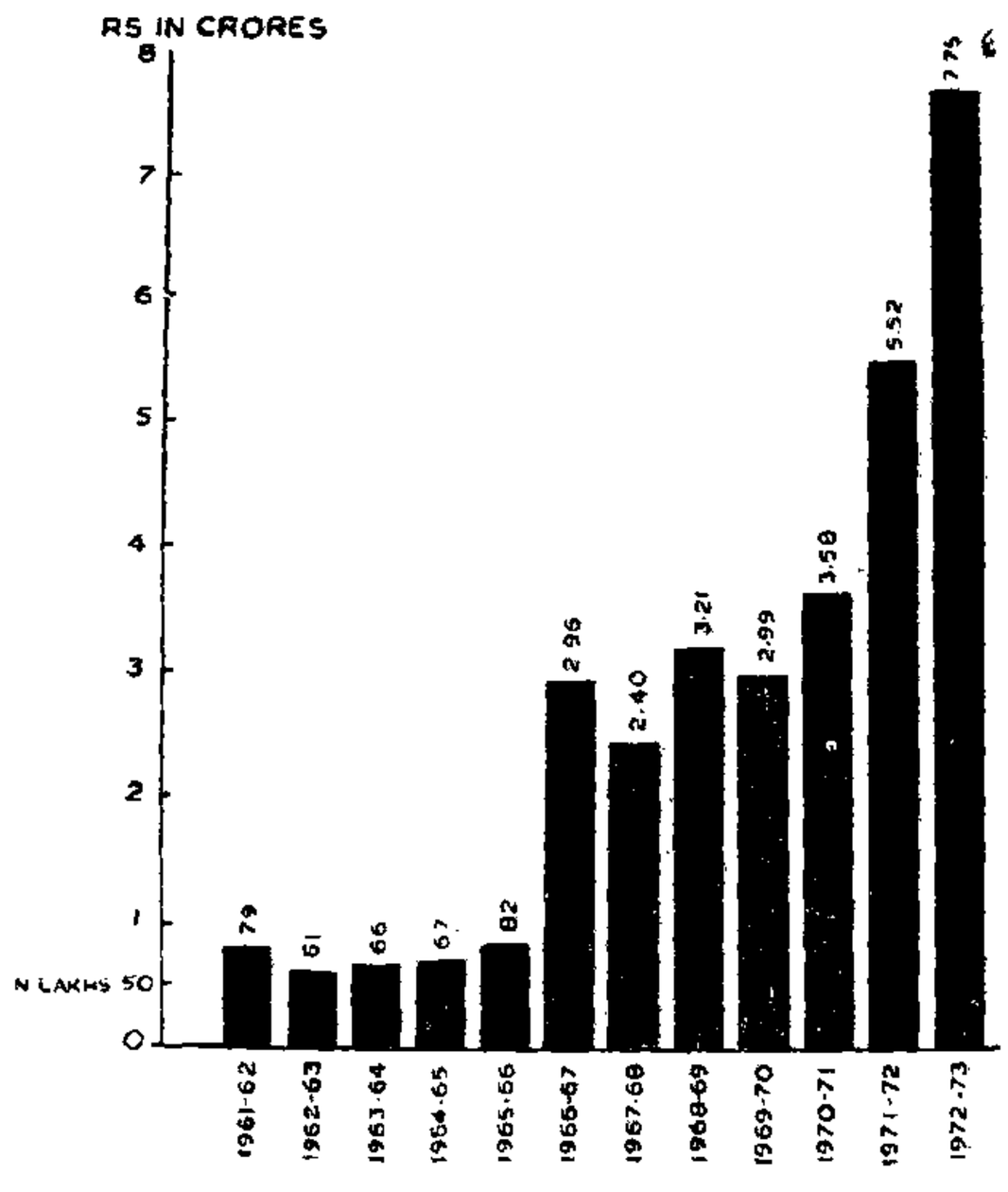

FIG. 2

system lies in the national grid of cooperative testing programmes and the rigour of the screening programmes of every experimental finding before it is passed on to the farmer. Since this aspect of our agricultural research system is not so widely known as it deserves to be, I would like to give a brief outline of the procedures followed.

Step 1.—After years of research, scientists develop new crop varieties/agronomic techniques.

Step 2.—New strain/practice is tested all over the country in coordinated trials for about three years or three seasons by numerous investigators belonging to different research institutions and Agricultural Universities.

Step 3.—New strain and the appropriate package of practices are tested under the All-India Coordinated Agronomic Experiments Scheme (steps 2 and 3 may take place concurrently).

Step 4.—Data from the coordinated trials are statistically analysed and discussed in annual workshops and recommendations made on the basis of such discussions.

Step 5.—Significant results are tested/demonstrated in farmers' fields under the National Demonstrations Programme and more recently also under the Minikit Programme.

Step 6.—The Central Variety Release Committee of the Union Ministry of Agriculture or the Variety Release Committees of Agricultural Universities/State Governments consider all the available data (yield, fertilizer response, disease and post reactions, quality characteristics, etc.) and make recommendations about the suitability of a new strain for release for cultivation by farmers. These Committees also specify the area of adaptation of the new varieties.

In crops like rice which are grown from sea level upto nearly 3,000 metres altitude considerable variations naturally exist with reference to adaptation for different agro-climatic conditions and consumer preferences and hence an intensive programme of minikit demonstrations-*cum*-trials have been initiated. The number of such demonstrations put up in farmers' fields with different new varieties during 1972 is given in Table I. No wonder that any

TABLE I

Minikits by rice varieties

Variety	No. States	Farmers
IET 1991 ..	17	20,360
IET 1039 ..	12	9,960
IR 579-48 ..	4	6,050
Galmidge Resistant Varieties ..	10	4,650
IR 20 ..	4	5,600
Vijaya ..	4	4,150
CR 44-35 ..	6	3,810
14466 ..	1	3,300
New Sabarmati ..	4	2,950
Basmati Dwarfs ..	5	2,475
Bala ..	2	2,000
Pankaj ..	2	1,700
Tungro Virus ..	..	..
Resistant Varieties ..	5	500
Cauvery ..	1	500
CR 36-148 ..	1	500
Malinja ..	1	500
CR 44-1 ..	1	310

variety or technique which has successfully passed through so many sieves becomes a success in the field. This does not mean that a new variety may not succumb suddenly to a new disease or a new strain of an already prevalent pathogen, *e.g.*, this is what happened with the famous miracle rice varieties in the Philippines when they were badly damaged by the Tungro virus outbreak during 1971. This is only a warning that there is no room for complacency and no time to relax as far as agricultural research, education and extension efforts are concerned.

Agriculture is becoming an increasingly sophisticated occupation. With the growing awareness of the ecological dangers arising from the inappropriate and unscientific use of agricultural inputs like pesticides, fertilizer and water, steps are under way to develop techniques like integrated pest control, watershed management, etc., which will ensure that productivity is continuously enhanced without any danger to the long-term production potential of the soil. We witness today two major kinds of agricultural growth in the world. In one system, like that prevailing in North America and Europe, more and more land is being cultivated by less and less number of people and farming is therefore a labour-displacing occupation. This has been achieved through extensive mechanisation and highly organised management. In contrast, in our country, agriculture has not only to be a source of food to the people but it has also to be for many years to come the most important instrument of economic growth and productive employment. To achieve agrarian prosperity, an increase in the *per capita* productivity is essential.

Modern agriculture rests upon four major revolutions : (*i*) agronomic (including genetic), (*ii*) chemical, (*iii*) engineering and (iv) management. It is only when all these four revolutions are synchronized in a perfectly coordinated manner that agriculture becomes highly efficient and competitive. While we may be justifiably happy at the progress that has been achieved during the last 25 years, the country needs even more significant results in the years to come. The investment on agricultural research and education made in the last few years will start giving a "pay off" only in the next few years. A dynamic production programme can be sustained only by a dynamic research and training programme. Unless the many complex and urgent problems arising from deficiencies in soil fertility, inadequacies in water management, poor pest control, improper storage and marketing arrangements and problems in animal health, nutrition and genetics are all faced and solved soon, the euphoria caused by the Green Revolution will be short-lived. Jawaharlal Nehru's statement "Agriculture cannot wait" is even more relevant today than when it was made 25 years ago.

RECENT ADVANCES IN THE CHEMISTRY OF TEA

S. NATARAJAN AND T. R. SESHADRI
Department of Chemistry, University of Delhi, Delhi-7

INTRODUCTION

IT is a significant capacity of human beings that though they may be living in far off places having entirely different climates and environments, they have exhibited somewhat the same needs and have made independent discoveries of materials to satisfy these needs. These materials have either the same chemical components or closely related ones. As an important example of this type may be mentioned beverages used as stimulants in various parts of the world from fairly ancient times. Tea which had its origin in China, coffee which originated from Arabia, cola-nuts from South Africa, maté or Paraguay tea from South America and cocoa, all provide stimulants which