CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Fourth Meeting, Washington, 2-4 August 1972

ASIAN VEGETABLE RESEARCH AND DEVELOPMENT CENTRE

(Item 4c)

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TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

ROME 1972
May 30, 1972

Dear Peter:

Enclosed you will find the response that we have prepared to the questions raised in your letter of May 3, 1972. I hope that they will be satisfactory.

I am fully aware of some of the serious considerations that the TAC is wrestling with regarding the AVRDC. Reading between the lines, I guess that the problems are more geopolitical than anything else and, of course, we regret the recent expulsion of the Republic of China (Taiwan) from the United Nations. I must say that when one is in Taiwan, business still goes on as usual, and I believe that we can operate satisfactorily there. With the substantial support that we are receiving from the Republic of China, and considering the stage of development at the time I made the commitment to serve as the first director, there seems to be no alternative but to continue to develop the Center in Taiwan.

The building program has gone ahead well, and the service building is now complete and most of the other buildings will be finished not later than August. We still need money for additional residences to accommodate the scientific staff, and we should have the training center building and the guesthouse within a year. Anyway, we are going ahead with our program because we are essentially assured of at least U.S.$1 million for operating costs.

I do hope that it will be possible for me to say a few words about the Center in Washington in early August. However, I do not want to be too pushy about it, and I shall do only what I am invited to do, of course.
After July 2, 1972, my address will be:

AVRDC
P.O. Box 42
Shanhua, Tainan
Taiwan (741)
Republic of China

With kind personal regards.

Sincerely yours,

Robert F. Chandler, Jr.
Director

Dr. Peter A. Oram
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Food and Agriculture Organization
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encl: a/s
Response to questions raised by the TAC as transmitted in Peter Oram's letter of May 3, 1972 to Robert F. Chandler.

For the sake of order and convenience, each question will be restated briefly here, followed by the answer we have prepared. They will be numbered as they were in Dr. Oram's letter.

1. The question was raised as to whether vegetables merit such high priority as compared to crops that are larger suppliers of calories and proteins to the inhabitants of developing countries; whether they might more properly be termed luxury crops. Also some felt that a Vegetable Center located in Taiwan might be too oriented toward export production rather than toward the needs of the other developing countries.

It is true that with the exception of a few starchy root crops, such as potatoes, cassava, sweet potatoes and yams, few peoples of the world use vegetables as their principle source of calories. The staple food of mankind as a whole is the cereal grains, principally rice, wheat, and maize. However, the cereals are generally low in proteins, minerals and vitamins, and the most logical and most common sources of these necessary ingredients of the human diet are the vegetable crops.

It is difficult to obtain accurate production and consumption data from the developing countries with respect to vegetables. However, the Department of Agricultural Economics of the College
of Agriculture of the University of the Philippines recently made a thorough study of the food consumption patterns of Filipinos. To support our claim that vegetables are by no means purely a luxury crop, may we cite a few figures from this study. Approximately 2,100 families, averaging 7.2 persons per family, were included in this survey. The per capita annual incomes varied from the equivalent of U.S.$500 to as low as U.S.$36, with an average of U.S.$157. Naturally the people consumed more cereal grains than any other commodity group (143.7 kilograms per person per year). However, vegetables came second with an average per capita consumption of 67.1 kilograms per year.

The families were separated into several groups in accordance with their incomes. The survey revealed that the five most popular vegetable crops consumed by the low income families (those with less than U.S.$60 per capita income), were (listed in descending order) sweet potato, eggplant, tomato, sweet potato tops, and water convolvulus. The comparable top ranking vegetables for the high income families (those with per capita incomes exceeding U.S.$230 per year) were tomato, cabbage, eggplant, onion and sweet potato. It is noteworthy that three of the vegetables were common to each group, viz. eggplant, sweet potato and tomato. Onions and cabbage, though desired by both groups, are more expensive than sweet potato tops and water convolvulus.
In our initial proposal we stressed the nutritional value of vegetables as a whole. Actually the protein yield per hectare per day for many vegetable crops exceeds that of rice, the most common source of both proteins and carbohydrates in tropical Asia. For example, considering that a yield of 5.75 t/ha is obtained in 115 days, and the rice grain contains 7.5 per cent protein, 332 kilograms of protein per hectare will be harvested. This is 3.26 kg/ha/day of protein. One of the highest sources of protein for tropical Asia is the green pods (comparable to snap beans) of the mung bean. Yields as high as 15.36 tons per hectare have been obtained, with a production of 632 kilograms per hectare of protein in 67 days, which is 9.50 kg/ha/day of protein. Even the dry mung beans in the same experiment* yielded 4.9 kg/ha/day, which is over three times the daily protein yield of rice. Similar data were obtained for soybeans.

To look at the situation another way, there are many vegetable crops that, when ready for serving, have a much higher

* A study of protein yields of vegetable crops conducted by Dr. Henry M. Munger at the College of Agriculture, Los Baños, Philippines in 1969-1970.
protein content than cooked rice. In the following table a few examples are cited:

<table>
<thead>
<tr>
<th>FOOD ITEM</th>
<th>PROTEIN CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybeans, boiled</td>
<td>12.8</td>
</tr>
<tr>
<td>Mung beans, boiled</td>
<td>11.0</td>
</tr>
<tr>
<td>Chick peas, boiled</td>
<td>9.3</td>
</tr>
<tr>
<td>Water convolvulus, boiled</td>
<td>7.4</td>
</tr>
<tr>
<td>Garlic</td>
<td>7.0</td>
</tr>
<tr>
<td>Sweet potato leaves, boiled</td>
<td>2.7</td>
</tr>
<tr>
<td>Taro, boiled</td>
<td>2.4</td>
</tr>
<tr>
<td>Rice, boiled</td>
<td>2.2</td>
</tr>
</tbody>
</table>

We do not wish to belabor the point except to point out again that if the effort is put into vegetable crop improvement that is planned by the Asian Vegetable Research and Development Center, we have every reason to believe that the income, the labor utilization, and the nutrition of the small Asian farmer will improve. In looking at human nutrition alone, we should not forget that polished rice contains no vitamin C and no vitamin A, while many vegetable crops produce abundant amounts of these essential constituents for human nutrition.
In answering the criticism that locating the Center in Taiwan may cause it to direct its program more toward the export crops, our answer is to ask the examiners of the proposal to note that we have no plans to work on the export crops. We shall let the canning industry or local government agencies handle research and development with such crops as asparagus, mushrooms, and pineapple, which are the prominent export crops of Taiwan. In a later section we shall go into a little more detail regarding plans for work outside of Taiwan.

It is our belief that the orientation of the research program of the Center will be such that the small farmer will be the first beneficiary. This does not mean that a large vegetable farmer, for example, could not benefit also. As we mentioned in our original proposal, there is little economy of scale associated with the vegetable crops. Also might we mention that there is nothing "evil" about developing a crop for export. Naturally we would be concerned with Asia and the tropical world as a whole - not alone with Taiwan.

2. The question was raised as to whether we have included too many vegetable crops for the budget and staff in our original proposal.

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This may be a warranted criticism of our plan. It was our intention to indicate how we would separate the vegetable crops
into three categories and assign one breeder-horticulturist to each group of vegetables. In the process, we mentioned quite a few different crops. Obviously, within each category we shall have to single out a few of the most important crops and direct our initial attention to them. We plan to examine the problems faced by the small farmer who lives in the hot, humid tropics with a rainy season of 6 to 8 months duration, but with inadequate rainfall during the remainder of the year. In addition to Taiwan itself, climates of this sort can be found in the Philippines, Laos, Cambodia, Vietnam, Malaysia, Indonesia, Thailand, Burma, Ceylon and the southern part of India. In other areas of the world it would include many parts of South America, of Central America, and of the equatorial regions of West Africa.

As was stated in our formal proposal to the TAC, the planning of the initial program is incomplete, due primarily to the fact that all those working on the project are now fully employed elsewhere and will not be able to devote full time to the effort until July 1972. Also, as was true at IRRI and at all the other centers, the real definition of the specific program came about after the initial scientific staff members were on the job. However, since we all agree that the initial focus must be on fewer crops we shall discuss the subject in the following paragraphs.
At the outset may we point out again that three full-time senior staff members with Ph.D. degrees will be handling the vegetable improvement program. They will be assisted by 12 Chinese professionals, each of whom will have received at least a B.Sc. degree. Thus with a team of 15 carefully selected people we should be able to handle a number of different projects effectively.

We do not plan to change the leafy vegetable program from the selections listed on page 9 of the proposal. Initial emphasis will be placed on Chinese cabbage, pechay and the common heading cabbage.

One of the projects to receive early attention is to develop open-pollinated varieties of common cabbage that will produce well in hot climates. Now all of the heat-tolerant cabbage varieties are hybrids and it is necessary to import F₁ seed from Japan or elsewhere.

Among the fruiting vegetables, major attention will be paid to the tomato, the eggplant, and the mung bean. The problems of the tomato and the eggplant in the tropics are well understood by anyone at all familiar with these crops. The mung bean, although containing somewhat less protein than the soybean, is already popular throughout the tropics and sub-tropics of Asia and its improvement will quickly benefit many farm families. Also no other international or regional center is placing emphasis on
this important crop. Great scope remains for increasing its
disease and insect resistance, its basic yield potential, and
the protein content of the seed.

Minor attention will be paid to sweet corn (one project is
specifically mentioned on page 15 of the proposal).

Also because of its popularity, the high income to be derived
from the crop, and the high incidence of disease and insect attack,
minor attention will be paid to the melons — particularly the
muskmelon.

Among the root, tuber, and bulb crops, major programs will
go ahead with the sweet potato, the onion, and the Chinese radish.
These, again, are selected because they loom large in human
nutrition and farm income in the tropics and sub-tropics.

We have already discussed the sweet potato on page 16 of the
proposal. It has been proved many times that more food per
hectare per day can be produced by growing sweet potatoes than by
any other important tropical crop. Dr. Ruben Villareal of the
Philippines in a paper entitled, "The vegetable industry's answer
to the protein gap among low salaried earners," showed that the
calories produced by a hectare of sweet potatoes, would support
twice as many people as would a hectare of rice. He showed also
that, compared with rice, a hectare of sweet potatoes would
produce 50 times more calcium, 12 times more iron, 8 times more
thiamine, and 11 times more riboflavin. The yellow sweet potato varieties now available are an excellent source of vitamin A, a vitamin completely absent in rice. Although top yields of sweet potatoes are high, average yields are low. We believe that with a good breeding program, coupled with intensive studies of management and physiology, an even better sweet potato can be created.

The onion is a popular crop because of its demand in urban markets. Onions are grown on many Asian farms as a cash crop on rice land during the off season. However, in the tropics, new seed has to be imported yearly because the varieties grown will not produce seed without special cold-temperature treatment - an impractical procedure under most circumstances. Some preliminary work indicates that progress might be made in developing a truly tropical onion, by crossing onion varieties from the Southern United States with varieties such as Dingras Red Globe from the Philippines and similar varieties developed in India. Such varieties are tolerant to tropical conditions but the bulbs are too small to compete on the market with the varieties grown from imported seed.

The Chinese radish is highly popular among Chinese, Koreans and Japanese, but it is eaten in varying degrees by other Asians as well. For example, Chinese radish production in the Philippines amounts to about 10,000 metric tons annually. In Taiwan, the production is over 10 times higher than in the Philippines.
In addition to these three major crops, considerable attention will be paid to the white potato. This will be a cooperative program with the International Potato Research Center in Peru (already we have had preliminary discussions with Dr. Sawyer, the director). The main objective in addition to developing disease and insect resistant varieties, will be to create a variety of white potato that will yield well in the humid tropics. Those who have worked with the crop in hot climates feel that this is a distinct possibility. There is no stigma attached to the white potato, as there is to the sweet potato, in Asia.

We realize that there is a feeling among TAC members that we are proposing too modest a budget. Undoubtedly we are asking for the minimum. Generally, we have considered that one senior scientist with four junior scientists and four farm laborers could do the job in each program. We shall mechanize our operation more than IRRI has, and, of course, we shall have to have high productivity per man. We are banking on the energy and drive of the Chinese people. We thought, also, (and perhaps we are wrong about this) that our project would be more appealing to prospective donors if we made an attempt to have a reasonably small operation which will be efficiently run, yet of sufficient size to have an impact. Certainly we could use more money and we could easily prepare a budget estimate that will give us more latitude than the existing one.
3. Certain TAC members considered that if the Center is to receive the endorsement of the Committee, its Board of Directors should come from more sources than the countries that are now contributing to the Center. The ideas were expressed that the governing Board must have ample degrees of freedom and that representatives of "member countries" should not interfere unduly with the policy decisions being made from time to time.

Without question the Director and Associate Directors agree with this viewpoint. Theoretically, there is no great problem. To quote Section 2 of Article II in the Charter of the AVRDC, "Section 2 - Membership shall also be open to other countries/organizations that are dedicated to the common cause of the Center, subject to the approval of the Board of Directors by majority vote of the members of the Board. Non-contributing members shall not be voted to become members of the Board of Directors but may participate as observers."

This, we realize, is not an entirely satisfactory statement and we shall attempt to change the Charter at the next meeting of the Board, which will be held in August or September 1972. The Director of the Center, who is also a member of the Board of Directors, will introduce a proposal to broaden the membership of the Board without tying it to actual monetary contributions. In
fact, the director would welcome a procedure for the selection of additional Board members similar to that used by ICRISAT.

We hope that we can reach some sort of a compromise so that we can continue to receive the moral and financial support of the contributing countries, and yet broaden the scope and thinking of the Board. We now believe that this will be possible.

May we state here that up until now the government of the Republic of China (Taiwan) has provided substantial support without dictating the courses of action. The Chairman of the Board, Dr. T.H. Shen, has welcomed the suggestions of the Director, and has cooperated 100 per cent. We believe that we are correct in stating that no other international center has received the financial support from its host country that AVRDC has.

4. The question was raised as to whether the location of the Center in Taiwan might restrict the free recruiting of scientists and the exchange of information on a world-wide basis.

The answer, as we see it, is that although we regret the present political situation and the exclusion of the Republic of China from the United Nations, we have not yet seen any signs of this becoming a limiting factor.

In the first place, the Republic of China has placed no restrictions on the admission of nationals from the so-called free
nations. For example, we are now negotiating with an Indian scientist, and the government officials state that this is all right even though the two countries have no diplomatic relations.

We are enclosing a copy of the "Memorandum of Understanding and the Charter," and on page 9 you will find an addendum to the memorandum of understanding, which describes the legal status, privileges and immunities of the AVRDC. It is clear that the Republic of China has done everything necessary to ease the operation of the Center and to accommodate its international staff.

With respect to the attitudes of prospective staff members, we have not yet encountered a single person who hesitates to accept a position on our staff because the Center is located in Taiwan. So far, we have been in touch with several Filipinos and Americans, a Malaysian, and two Indians, and all are anxious to be considered. Some 30 persons have written to us about senior positions. Only one of these seems to be of high enough calibre to receive further consideration. We are dealing directly with a number of outstanding young scientists and we expect to hire several of them within the next few months. In fact our real worry is that we shall not have enough houses to accommodate the initial group of scientists whom we deem essential for a proper beginning of our research program.

We agree that we should have active programs in several countries. Right now we are thinking of a possible "relay station"
in Thailand and another one in Korea. The one in Thailand would give us an opportunity to do some intensive work in the real humid tropics, where the winter temperatures are higher than in Taiwan. The Korean station would probably develop into a place for studying vegetable seed production, with the idea in mind of Korea (still an underdeveloped country) becoming a major producer of vegetable seed for the tropics (of course principally with those vegetable crops that do not produce seed in the tropics).

We also plan to carry on cooperative work with such Asian countries as the Philippines, Indonesia, Malaysia, India and Ceylon. Separate financial support will be sought for work in these countries chosen for intensive cooperative programs.

You asked that we spell out more clearly our ideas regarding work in other countries. This would have to be done in consultation with the countries involved and we would not wish to be presumptive in describing them now. Also we wish to travel more widely, learn more about the present facilities and activities in the other countries of the region before working out definite plans.

There seems to be a feeling in the TAC that by calling our organization, "The Asian Vegetable Research and Development Center" that we are too restrictive for consideration by international aid agencies. We believe that because Asia contains some 2 billion of the world's population that it is deserving of major attention.
Certainly there will be no restriction regarding the distribution of seed, literature or anything else of value. It is only a matter of concentrating enough to have an impact. We see no difference between our choosing to concentrate on Asia, and the decision that CIAT principally will look after the problems of Latin America and IITA will handle the African scene.