

International Symposium on Production of Vegetables in the Tropics and Sub-Tropics

Sponsored by
Tropical Agriculture Research Center,
Ministry of Agriculture, Forestry and Fisheries, Japan
(September 20-22, 1989, Tsu, Mie Japan)



The 23rd International Symposium on Tropical Agriculture Research entitled "Production of Vegetables in the Tropics and Sub-Tropics" organized by Tropical Agriculture Research Center (TARC) in collaboration with National Research Institute of Vegetables, Ornamental Plants and Tea (NIVOT) was held at the Tsu Center Palace Hall, Tsu, Mie, on 20-22 September 1989.

The objective of the Symposium was to provide a forum to consider and discuss the following issues:

(1) Production trend of major vegetables in the tropics and sub-tropics during the last decade;

(2) Constraints to increased vegetable production, with a special attention to unstable yield caused by diseases and quality deterioration during the transportation under high temperature;

(3) Well documented examples of improvement of vegetable production technology over the past decade; and

(4) Recent progress of vegetable research.

The Symposium was attended by the scientists from Brazil, the People's Republic of China, India, Indonesia (paper presentation), Japan, Malaysia, Peru, the Philippines, Sri Lanka and Thailand. The delegates from the FAO Regional Office for Asia and Pacific (FAO RAPA) and international and regional agricultural research institutions, including Asian Vegetable Research and Development Center (AVRDC), International Potato Center (CIP), International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), International Center for Agricultural Research in the Dry Area (ICARDA), Centro Internacional de Agricultura Tropical (CIAT), also participated in the Symposium. The

total attendants were approximately 200 persons. Eleven delegates from the eight Asian countries, Brazil, Peru and FAO/RAPA presented reports on the trend of and constraints to vegetable production and on the current status of research on vegetables. Twenty-two speakers presented technical reports on various issues relating to vegetable production in the tropics and the sub-tropics.

The program of the Symposium and the speakers are presented hereafter.

Opening Session

Inaugural Address:

Chukichi KANEDA

Director General, TARC

Welcome Address:

Toshihiko NISHIO

Director General, Secretariat of the Research Council, Ministry of Agriculture, Forestry and Fisheries

Kunio YAMAKAWA

Director General, NIVOT

Country Reports

- 1) Present Status and Future Prospects of Vegetable Research and Development in India
R. PHAL (India)
- 2) Vegetable Production in Sri Lanka
K. D. A. PERERA (Sri Lanka)
- 3) Status of Vegetable Industry in Malaysia
S. H. ANANG (Malaysia)
- 4) Vegetable Production in Thailand
M. THONGJIEM (Thailand)
- 5) Constraints and Opportunities in the Production of Vegetables
SUBIJANTO (Indonesia, Not presented)
- 6) Vegetable Production in the Philippines
M. M. PAJE and R. L. VILLAREAL (the Philippines)
- 7) Recent Development of Vegetable Production in China
Y. H. LI (the People's Republic of China)
- 8) Current Situation and Major Constraints on Melon and Watermelon

Cultivation in Peru

G. N. CHENG (Peru)

- 9) The Present Situation of Cabbage Breeding in Brazil
L. B. GIORDANO (Brazil)
- 10) Current Situation of Vegetable Production and Research in Japan
A. KOTANI (Japan)
- 11) Vegetable Production and Germplasm Conservation in Asia-Pacific Region
R. B. SINGH (FAO RAPA)

Technical Reports

- 1) Inheritance of Papaya Ringspot Virus-W Strain (Watermelon Mosaic Virus-1) Resistance in Interspecific Hybrid between *Cucurbita ecuadorensis* × *C. maxima*
S. TASAKI (Japan) and A. N. DUSUI (Brazil)
- 2) Onion Seed Production in Sri Lanka
S. YAZAWA (Japan)
- 3) Basic Requirements for True Potato Seed (TPS) Production
Y. EGUCHI (Japan) and N. G. MAZA (Peru)
- 4) Potato and Sweet Potato Research: A World Mandate for the International Potato Center
D. J. MIDMORE (CIP)
- 5) Achievements of Joint Research in Heat-Tolerant Vegetable Crops
Y. S. SHEN (the People's Republic of China)
- 6) Breeding of Cucumber, Pepper and Chinese Cabbage for Adaptability to Summer Cropping in China
K. HIDA, T. NAKASHIMA (Japan), Y. S. SHEN, A. S. ZHOU (the People's Republic of China)
- 7) Development of Interspecific Hybrids between *Brassica oleracea* and *B. campestris* Adapted to the Tropics
M. HOSSAIN (Bangladesh), H. INDEN and T. ASAHIRA (Japan)
- 8) Snap Beans: Their Constraints and Potential for the Developing World
G. HENRY (CIAT)

- 9) Recent Progress in Winged Bean Research
H. OKUBO, K. FUJIEDA and S. UEMOTO (Japan)
- 10) Effects of Waterlogging on Growth and Yield of Yard Long Bean
E. NAWATA, S. YOSHINAGA and S. SHIGENAGA (Japan)
- 11) Cultivation of Temperate Vegetables in the Tropics
T. HANADA (Japan)
- 12) Studies on Stress Tolerance of Vegetables in China—Effect of Cover Materials on Growth and Yield of Sweet Pepper
T. NAKASHIMA, K. HIDA (Japan), W. ZHOU and K. LAI (the People's Republic of China)
- 13) Effect of Row Cover Treatment on the Prevention of Typhoon Damage in Vegetables
K. OZAWA (Japan)
- 14) Alleviation of Occurrence of Tipburn and Internal Rot in Tropical Chinese Cabbage
H. IMAI (Japan)
- 15) Identification of Virus Diseases Affecting Some Vegetable Crops in West Malaysia and the Southern Part of China
I. FUJISAWA (Japan), S. H. ANANG (Malaysia), Y. S. SHEN and A. J. ZHOU (the People's Republic of China)
- 16) Ecology of the Leaf-Footed Plant Bug, *Leptoglossus australis* Fabricius, in the Sub-Tropical Region of Japan
K. YASUDA (Japan)
- 17) Measurement of Heat Sensitivity in Cucumber Leaves by Chlorophyll Fluorescence Method
S. AOKI (Japan)
- 18) Production of and Research on Strawberry in Japan
O. YAMAKAWA (Japan)
- 19) Postharvest Quality Maintenance of Vegetables
R. SAIJO (Japan)
- 20) Genetic Improvement of Selected Vegetables for the Tropics and Sub-Tropics
R. T. OPENA (AVRDC, Not present and the paper was read by H. Kobayashi)
- 21) Research on Faba Bean, Lentil and Kabuli Chickpea at the International Center for Agricultural Research in the Dry Areas
M. C. SAXENA (ICARDA)
- 22) ICRISAT's Research on Groundnut, Pigeonpea and Chickpea
C. JOHANSEN, D. McDONALD, L. SINGH and H. A. VAN RHEENEN (ICRISAT)

General Discussion

The general discussion was co-presided by Johansen, C. (ICRISAT), Saxena, M. C. (ICARDA), Imai, H. (TARC, Japan), Seyama, N. (NIVOT, Japan). At first, Seyama, N. summarized some of the main problems brought forth in the presentations of the country and technical reports. These problems are grouped into four categories as follows: (1) lack of good cultivars well-adapted to the tropics and subtropics; (2) insufficient development of cultivation methods and production systems; (3) insufficient development of pest and disease control; and (4) inadequate handling and transportation system of vegetable products. Then, Seyama, N. (Chairman) proposed to discuss on the following four issues which may be alleviate some of the constraints to vegetable production: (1) some important problems which had not been adequately discussed in the country and technical reports; (2) promotion of the cooperative network to efficiently develop production technology; (3) collection, preservation, characterization and utilization of genetic resources; and (4) application and transfer of advanced techniques such as biotechnology.

Referring to the first issue above, Midmore, D. J. (CIP) elaborated main strategies of CIP in the sweet potato program, stating that the priorities were placed on breeding of varieties which suited dry and saline conditions with high tolerance in the rainy season.

In the research program on weevil, which is also very important, a close cooperation has been initiated between CIP and AVRDC to evaluate germplasm, taking into account the difference in species patterns between the two regions; i.e. South America and Asia. Kobayashi, H. (AVRDC) indicated that one of the breeding objectives at AVRDC included high protein content in relation to the carbohydrate content. Kobayashi, M. (TARC, Japan) stressed the importance of quality of the products for the increased consumption and area expansion of sweet potato, proposing that greater emphasis be placed on quality improvement under the tropical and subtropical condition. Hanada, T. (TARC, Japan) proposed that in order to alleviate various constraints such as excessive high temperature, strong solar radiation, typhoon, and diseases and pests in the tropics and subtropics, greater efforts of research be oriented towards the development of well-adapted cultivars as well as of protection methods such as mulching.

Johansen, C. (Chairman) raised an issue in regard to the type of cooperation which would be suitable to alleviate the above constraints on vegetable production, including international network activities and relevant institutes under the CGIAR system. In this respect, Singh, R. B. (FAO RAPA) explained the efforts of FAO made for the establishment of a research network on vegetables in Asia. He reported that an informal regional network, independent of government control, consisting of vegetable research institutions in the region had been established in accordance with the decision of the expert meeting held in Bangkok in 1988. The network will include the following activities: (1) collection and dissemination of genetic resources of vegetables and their exchange; (2) organizing of training programs; (3) support for the improvement of infrastructure to strengthen national vegetable research and development programs. To this effect, a regional project was formulated under UNDP funds in the 1988 meeting. Nkansah, G. O. (Ghana) pointed out that the research results and technological innovations had not been effec-

tively transferred to the farmers due to various reasons such as lack of funds, inadequate storage and distribution facilities, lack of irrigation facilities and ineffective extension services. He stressed, among others, the importance of joint program activities of the relevant various institutions. Henry, G. (CIAT) expressed his view that there would be a need for the establishment of a 'formal' international center for research on vegetables. He informed that the Technical Advisory Committee of the CGIAR had put forward a few proposals in this respect.

Saxena, M. C. (Chairman) raised an issue for discussion on how the valuable genetic resources from specific areas could effectively be collected, preserved, characterized and shared among the interested parties for use. In this regard, Singh, R. B. (FAO RAPA) stressed the urgency of this matter, indicating that the present situation was critical, under which indigenous variability would be lost seriously along with the inevitable replacement by modern and hybrid varieties. FAO and IBPGR set up several regional networks in collaboration with the South and Southeast Asian countries, as well as with Japan which took a leadership in collecting indigenous materials in this region. They identified priorities for the collection and conservation of genetic resources of crops including vegetables. Through these efforts, sizeable collections were achieved. It was agreed at the Symposium, however, that priorities should also include: (1) characterization of the collections; (2) elimination of duplications; (3) further collection and characterization as well as exchange of information; and (4) effective and efficient quarantine systems. FAO in cooperation with IBPGR has its own programs in this content. The CGIAR institutes also deal with this problem and Japan is engaged in bilateral programs with several countries to assist them in building gene banks. It would therefore be desirable to coordinate all these activities to maximize their efforts in strengthening national capabilities to promote vegetable germplasm research and development. Kobayashi,

H. (AVRDC) presented the AVRDC plan to establish a data bank for collection, conservation, evaluation and characterization of germ-plasm as well as distribution and establishment of regional or international networks. Saxena, M. C. (Chairman) indicated that the most important issue would be to identify responsible institutions for the characterization of the genetic resources for specific traits. He also emphasized that more reliable and efficient screening techniques should be developed. There would also be a need for continuing collections, identifying the gaps, avoiding duplication and filling in related responsibilities of characterization.

Imai, H. (Chairman) chaired the discussions relating to the use of new and advanced techniques for the improvement of vegetable production. Hirai, M. (NIVOT, Japan) presented an outline of the present status of research and application of biotechnology for vegetable improvement. He indicated that biotechnological methods could be divided into two groups; i.e. cellular level and molecular level. The first involves the propagation of plants and cultivars by cloning and inter-species hybridization. Propagation by in-vitro culture is likely to become very effective in the future. Embryo culture would also be important. However, there would be great limitations since it would not always be possible to cross remote species. Cell fusion techniques could be effective but are complex. However, the inter-species hybridization enables to broaden the genetic variability of breeding materials. In the second level, transformation systems for vegetable crops are presently under study at NIVOT. Successful results have been obtained in the transformation of vegetables such as tomatoes, eggplant and lettuce through the use of *Agrobacterium* as a vector. For the development of techniques at molecular level, it is very important to specify characters valuable for agriculture at biochemical level in order to identify key enzymes relevant to the concerned characters and undertaking molecular cloning of important genes. In utilizing genetic resources, relevant areas of application of biotechnologi-

cal innovations to the characterization of economically important genes need to be clearly specified. In this regard, it would be required to assign appropriate institutions so that they can assume a leadership in the designated areas. It must also be reminded that the conventional breeding program is the background for the development of new varieties, considering that the biotechnological method alone would not meet the entire requirements for the development of new varieties. In this connection, Singh, R.B. (FAO RAPA) stressed that biotechnological tools should be used as an adjunct to the conventional breeding approaches. Based on capabilities or needs, the various levels of biotechnology should be advocated to suit the levels of country development. A desire was expressed that just as the Rockefeller Foundation did earlier in rice, Japan could take a leadership in developing a network on biotechnology for a few major vegetables to supplement conventional breeding work and make it more efficient, precise and effective. Kobayashi, M. (TARC, Japan) pointed out that presently, it would be ambitious to expect too much from biotechnology because it is only a part of the needed technology and not an integrated system. It is necessary to identify which technique would be practically useful for combining with conventional method. He suggested that diagnosis techniques be practical to improve the efficiency of crop improvement.

Seyama, N. (Chairman) concluded the general discussion appreciating that a wide range of important problems was covered by this symposium. He stressed that in order to alleviate various constraints to vegetable production in the tropics and subtropics, new technologies should be developed through research programs, in which conventional technology will have to be combined with new methods to be developed. Towards this end, close cooperation at the international and regional levels encompassing a wide range of scientific fields and mutual exchange of information and expertise is required. In particular, the formation of a cooperative

network should receive a serious attention of the concerned parties and individuals.

Closing Session

Closing Remarks:

Hideo YASUI

Director, Department of Eco-Physiology,
NIVOT

(Y. Ohno and N. Seyama)