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The 8th May, 1978.

Shri A.K.Basu,
Secretary,
Indian National Commission For
Cooperation With Unesco,
Government of India,
Ministry of Education and
Social Welfare,
(Department of Education)
New Delhi.

Dear Sir,

Re. Nomination for Unesco Science Prize

In inviting reference to your letter No.F.30-3/78-INC dated March 22, 1978, it is our great pleasure to nominate Dr.M.S.Swaminathan, Director General, Indian Council of Agricultural Research, Krishi Bhavan, Dr.Rajendra Prasad Road, New Delhi-1, who is a senior past General President of the ISCA and has made outstanding scientific contributions in the field of agricultural research, for Award of the above Unesco Prize.

As desired, seven copies each of a statement containing the biadata of Dr.Swaminathan, and a short note on his achievement are enclosed.

For further information, if any, in regard to details of Dr.Swaminathan's contributions, he himself may be contacted at his New Delhi address. We are endorsing a copy of this letter to him for information.

Yours faithfully,

Sd/-

Encl:

(A.K.Sharma)

Memo No. 908/29B/78-79.

The 8th May, 1978.

Copy for information to:

✓ Dr.M.S.Swaminathan, Director General, Indian Council of Agricultural Research, Krishi Bhavan, Dr.Rajendra Prasad Road, New Delhi.

(A.K.Sharma)

Bio-data of Dr. Monkombu Sambasivan Swaminathan

1. Born on 7.8.1925 in Kumbakonam in Tamil Nadu
2. Father: Late Dr. M. K. Sambasivan, and eminent surgeon and hailing from Monkombu in Kerala State.
3. Education:
 - (a) B.Sc. from Travancore University in 1944.
 - (b) B.Sc. Agriculture from the Coimbatore Agricultural College, Madras University, 1947.
 - (c) Associateship of the Indian Agricultural Research Institute, New Delhi, in Genetics and Plant Breeding in 1949.
 - (d) Ph.D. from the School of Agriculture, University of Cambridge, U.K. in 1952.
 - (e) UNESCO Fellow in Genetics at the Agriculture University at Wageningen, The Netherlands, during 1949-50 and Research Associate in Genetics at the University of Wisconsin, United States during 1952-53.
4. Honorary Degrees: D.Sc. from:-
 - (a) The Sardar Patel University, Vallabh Vidyanagar (1970).
 - (b) The Haryana Agricultural University, Hissar (1973).
 - (c) The Andhra Pradesh Agricultural University, Hyderabad (1973).
 - (d) The Andhra University, Waltair (1972).
 - (e) G. B. Pant University, Pantnagar (1974).
 - (f) Jodhpur University, Jodhpur (1975).
 - (g) Marathwada Krishi Vidyapeeth, Parbhani (1975).
 - (h) Kumaon University (1975).
 - (i) Burdwan University, Burdwan (1976).
 - (j) Agra University, Agra (1978).
5. Professional positions:
 - (a) Assistant Botanist at the Central Rice Research Institute, Cuttack, 1954.
 - (b) Assistant Cytogeneticist (1954-56), Cytogeneticist (1956-61), Head of the Division of Botany (1961-66) and Director (1966-1972) at the Indian Agricultural Research Institute, New Delhi.
 - (c) Director General, Indian Council of Agricultural Research and Secretary to the Government of India (1972 onwards).

6. Positions held in scientific/professional committees/academics:

National

- (a) Secretary, Indian National Science Academy (1969-72).
- (b) President, Indian Society of Nuclear Techniques in Agriculture & Biology (ISNA) - (1971-77).
- (c) President, Indian Society of Agricultural Statistics (1972).
- (d) President, The Nutrition Society of India (1973-77).
- (e) President, Indian Society of Genetics and Plant Breeding (1965 & 1975).
- (f) President, Indian Society of Agricultural Economics (1977).
- (g) President, Indian Society for Cotton Improvement (1975-76 and 1976-77).
- (h) Chairman, Planning Commission Panel on Irrigated Farming.
- (i) Chairman, Planning Commission Panel on Dry Farming.
- (j) Member, CSIR Inquiry Committee.
- (k) Member, National Commission on Agriculture (1970-75).
- (l) Chairman, High Level Committee to review the functioning of the Central Water and Power Research Station and Central Soils and Materials Research Station.
- (m) Chairman, Committee of Scientists for examining the data relating to the wholesomeness of irradiated potato, onion and wheat.
- (n) Chairman, Committee on Cooperative Training and Management.
- (o) Chairman, Committee on International Collaboration.

International

- (a) Vice-Chairman, Technical Advisory Committee to the Consultative Group on International Agricultural Research constituted by the Food and Agriculture Organization of the United Nations, International Bank for Reconstruction and Development and the U.N. Development Programme (1971-1976).
- (b) Vice-Chairman, Protein-Calorie Advisory Group to the United Nations System (1972-1976).
- (c) Vice-Chairman, Board of Trustees, International Council for Research on Agro-Forestry (1977 onwards).
- (d) Member, Board of Trustees, International Maize and Wheat Research Centre, Mexico (1972-78).
- (e) Member, Board of Trustees, International Crop Research Institute for the Semi-Arid Tropics (1972 onwards).

- (f) Vice-President, Society for the Advancement of Breeding Research in Asia and Oceania (1977-1981).
- (g) Chairman, International Scientific Committee constituted to review the research contributions of the International Rice Research Institute, The Philippines (1975).
- (h) Vice-President, International Congress of Genetics, The Hague (1963).
- (i) Chairman, Committee of the Whole, U.N. Conference on Desertification, Nairobi, 1977.
- (j) Vice-President-elect, International Congress of Genetics, Leningrad (1978).
- (k) Chairman, International Wheat Genetics Committee (1978-83).
- (l) Member, Co-ordinating Committee, Rubber Research Institute of Malaysia (1978 onwards).

7. Research publications:

Over 200 research papers in national and international journals.

8. Teaching work:

Has guided over 50 students in their Ph.D. thesis work.

9. Extension education:

- (a) Developed the concept of "National Demonstrations" in 1964 in order to enable scientists to directly test and demonstrate the validity of their experimental findings in farmers' fields.
- (b) Demonstrated the concept of "Seed Village" in the Village Jounti in Delhi State.

10. Assistance in the formulation of Development Projects:

Assisted in the initiation of the High-yielding Varieties Programme, Dry Land Farming Pilot Projects, Multiple Cropping Pilot Projects and the Intensive Cotton Development Programme.

11. Recognition by Scientific Academies:

- (a) Fellow of the Indian National Science Academy (F.N.A.) - (1962).
- (b) Fellow of the Indian Academy of Sciences (F.A.Sc.) - (1957).
- (c) Honorary Fellow of the National Academy of Sciences, India (1976).
- (d) Honorary Fellow of the Swedish Seed Association, Sweden (1971).
- (e) Fellow of the Royal Society of London (F.R.S.) - (1973).
- (f) Foreign Associate, National Academy of Sciences of the United States (1977).
- (g) General President, Indian Science Congress, Waltair, 1976.

12. Scientific awards:

- (a) Shanti Swarup Bhatnagar Award for contributions to Biological Sciences (1961).
- (b) Mendal Memorial Award of the Czechoslovak Academy of Sciences for contributions to Plant Genetics (1965).
- (c) Birbal Sahni Medal of the Indian Botanical Society for contributions to Applied Botany (1966).
- (d) Silver Jubilee Commemoration Medal of the Indian National Science Academy for contributions to genetical and agricultural research (1973).
- (e) Barclay Medal of the Asiatic Society for contributions to genetics (1974).

13. Awards by the President of India:

- (a) Padma Shri (1967)
- (b) Padma Bhushan (1972)

14. Award for Community Leadership:

Awarded the Ramon Magsaysay Award for Community Leadership in 1971, in recognition of contributions as "scientist, educator of both students and farmers and administrator towards generating a new confidence in India's agricultural capabilities".

15. Major scientific contributions:

Has worked in collaboration with colleagues and students on a wide range of problems in basic and applied plant genetics over a period of 30 years. Among the more important contributions are —

- (a) elucidation of the origin and differentiation of potato species.
- (b) understanding the genetic relationships among wheat species.
- (c) accomplishment of difficult crosses in potato and jute species.
- (d) standardisation of techniques for the induction of polyploidy (i.e. doubling the number of chromosomes) in several economic plants.
- (e) elucidation of the factors influencing the induction and recovery of mutations in high plants.
- (f) identification of the barriers to high yields in wheat and the initiation of the wheat breeding programme, involving the "Norin" dwarfing genes obtained from Mexico.
- (g) development of the concept of "Crop cafeterias", "mid-season corrections in crop scheduling" and alternative cropping strategies for different weather conditions.
- (h) purposeful manipulation of genes in improving the yield, quality and stability of performance of several economic plants.
- (i) development of whole village or watershed operational research projects based on principles of ecology and economics.

Dr.M.S.Swaminathan

Scientific Contributions*

Monkombu Sambasivan Swaminathan, a distinguished Indian agricultural scientist, was elected this year as a Foreign Associate of the National Academy of Sciences, Washington, USA, in expression of the Academy's "Profound appreciation of his services to science". Dr.Swaminathan is the third Indian scientist to be honoured by the National Academy of Sciences, one of the highest recognitions of achievements in the scientific world. Dr.Swaminathan was earlier elected "for his contributions to the genetics and breeding of crop plants and his application of agricultural science that have resulted in improved crop production" as a Fellow of the Royal Society, London, he being the only Indian scientist to be thus honoured by both these prestigious learned Societies. Dr.Swaminathan has been similarly honoured by the Indian National Science Academy, the Indian Academy of Sciences, the National Academy of Sciences of India, and the Swedish Seed Association, SVALOF.

Dr.Swaminathan's research interests have been wide and extensive and he has been the leader of a productive school of research workers. Starting his research career at the Indian Agricultural Research Institute, New Delhi, in 1947, with a study of the inter-relationships in the genus Solanum, Dr.Swaminathan made an outstanding contribution to our understanding of the cyto taxonomical relationships in the tuber-bearing Solanum. The extensive research carried out by him at Wageningen, Cambridge and Wisconsin helped to elucidate the origin of the potato, Solanum tuberosum, the nature of the polyploidy in this important taxon and its inter-relationship with related cultivated and wild species. Using new techniques, he was able to obtain previously unsuccessful hybrids and transfer of valuable characters into cultivars.

On his return to India, Dr.Swaminathan created a vigorous school of cytogenetics, plant breeding and radiation research. Under his leadership, several basic problems were elucidated, such as the differentiation of hexaploid Triticum species, the relationship of T. zhukovskyi, the origin of dwarf coconut palm, the role of macromutations in species differentiation, the development of monosomic series in wheat and its utilisation in mapping the genes in wheat etc. Using wheat, barley and rice as test organisms, the extensive studies of this school not only gathered considerable fundamental information about the process of mutation and factors controlling the phenomenon, but helped to highlight (i) the mutagenic properties of vegetable oils, and (ii) the indirect

* A paper prepared by the Editor, Indian Journal of Genetics and Plant Breeding in 1977.

effects of irradiating the culture medium on which the test organism, Drosophila melanogaster was raised. Such indirect effects later confirmed at several institutions, led to the inclusion of genetic criteria in the assessment of the wholesomeness of articles of human consumption subjected to irradiation for prolonging their shelf-life.

As Head of the Division of Botany and later Director of the Indian Agricultural Research Institute, Dr. Swaminathan became convinced that the key to removing the yield barriers in wheat lay in the dwarf, non-photosensitive plant types of the kind developed by Dr. N.E. Borlaug in Mexico. On Dr. Swaminathan's initiative, the Government of India invited Dr. Borlaug to visit India in 1963 and review the wheat situation. This led to the obtaining of a wide range of dwarf wheat material from Mexico and the initiation of an intensive wheat improvement programme designed to develop high-yielding varieties of wheat suitable for Indian cultivators and consumers. In addition to direct introduction of varieties developed in Mexico and selection of the advanced generation material from that country, Dr. Swaminathan initiated a programme of developing new high-yielding varieties both by hybridisation with Indian varieties and by mutation rectification of specific defects such as replacing red grains of Sonora 64 and Lerma Rojo 64-A by amber-grained Sharbati Sonora and Pusa Lerma. A dwarf durum wheat breeding programme was also initiated resulting in strains such as 'Malavika'. Dr. Swaminathan and his school have made important contributions in other crops also including the development of short-duration, widely adapted high-yielding strains of rice (Pusa-2-21) and scented (basmati) type 'Improved Sabarmati', improved cultures of jute derived from crosses of Corchorus olitorius and C. capsularis, obtained for the first time through a new technique involving grafting and others. In addition to active personal involvement in these research projects, he provided overall guidance to the research thrusts of IARI during 1966-72, in his capacity as Director.

Realising the importance of effectively bridging the gap between research results and their application on the farm, Dr. Swaminathan developed as early as 1964 the National Demonstration Programme which enabled the scientists to demonstrate on cultivators' field the potential of the high yielding varieties of cereals and the optimum package of management practices. These demonstrations had a very favourable impact on farmers all over the country and contributed substantially to the rapid adoption by the farmers of the new varieties and the new practices, paving the way for launching of the High Yielding Varieties Programme by the Government of India in 1966 and for the successful wheat revolution exemplified by the increase in wheat production by more than 200% within the short period of a decade. Over the years, Dr. Swaminathan has developed these concepts further, resulting in the Whole Village/Watershed Operational Research Projects sponsored by the Indian Council of Agricultural Research in 1975.

An important contribution made by Dr. Swaminathan in this connection was the Seed Village Programme under which entire village communities were encouraged and assisted to develop into high quality seed producing centres.

Among the several honours and medals he has received, mention may be made of the Ramon Magsaysay Award for Community Leadership in 1971, recognising his multifaceted contribution as "scientist, educator of both students and farmers and administrator towards generating a new confidence in India's agricultural capability".

Dr. Swaminathan has given generously his time for the development of science at the national as well as at the international levels. The invaluable contributions he has made to the Indian Society of Genetics and Plant Breeding as Secretary, President and member of the Executive Committee are well known and wide appreciated. The great respect in which he is held by the Indian scientific community is clear from his election as an office bearer of several learned societies. He has been the President of the Nutrition Society of India and the Indian Society of Agricultural Statistics since 1973 and was elected in 1976 as the General President of the Indian Science Congress, in which capacity he gave a new meaning to the annual session of the Congress by introducing the concept of a focal theme for each annual session. The annual session in 1976 over which he presided focussed on the extremely timely and relevant problems of "Science and Integrated Rural Development". He served as the President of the Indian Society of Agricultural Economics in 1977.

Dr. Swaminathan's services have been equally in demand at the global level also where he played a very important role as Vice-Chairman of the Technical Advisory Group (TAC) to the Consultative Group on International Agricultural Research and of the Protein-caloric Advisory Group of the UN. He is a member of the Board of Trustees of CIMMYT, Mexico and ICRISAT, Hyderabad. He was the leader of the Review Mission, the first of its kind set up by the Consultative Group on International Agricultural Research for assessing the quality and value of the scientific programmes of the International Rice Research Institute, The Philippines, in order to assure the Consultative Group that the operations of the Institute are being carried out in line with the declared policies and to the full international standard expected. The Committee submitted its valuable and high appreciated report in April 1976. At Dr. Swaminathan's initiative, an International Group was convened in 1974 at New Delhi by TAC to review the biology of yield in grain legumes and to suggest methods of developing high-yielding varieties of pulses.

Dr. Swaminathan was elected Vice-President of the International Congress of Genetics in 1963 and will also be a Vice-President of the next session of the Congress to be held in Moscow in 1978. He is currently the Vice-President of the SABRAO (Society for the Advancement of Breeding Research in Asia and Oceania). He was elected Chairman of the Committee of the Whole Conference of the UN Conference on Desertification held at Nairobi in 1977 and in this capacity played an important role in finalising an action plan for combating desertification. During 1977, he was also elected as Vice-Chairman of the Board of Trustees of the International Council for Research on Agro-Forestry (ICRAF).

Perhaps the following words of the Nobel Laureate, Dr. N. E. Borlaug, sum up most aptly one of the major contributions of Dr. Swaminathan to India's and world's food availability: "The green revolution has been a team effort and much of the credit for its spectacular development must go to Indian officials, organisations, scientists and farmers. However, to you, Dr. Swaminathan, a great deal of the credit must go for first recognising the potential value of the Mexican dwarfs. Had this not occurred, it is quite possible that there would not have been a green revolution in India".
