

S.No. 1(R)

K. P. A. MENON
SECRETARY



Telegram : "AGRISEC"
Telephone : 36977

INDIAN COUNCIL OF AGRICULTURAL RESEARCH
DR. RAJENDRA PRASAD ROAD, KRISHI BHAVAN, NEW DELHI-1.

D.O. No. 34/Secy./67

January 10, 1967
13

My dear Dr Swaminathan,

I am forwarding herewith papers containing your note on the proposed meeting between the agricultural scientists and the industrialists, and DG's further remarks. I have kept copies for my own file. As per the draft you have put up, you had wanted the letters to be issued under my signature. Since Dr Roy and Dr Gulati are to function as the scientific secretaries of the Seminar, they may be requested to give me a complete list of invitees. Since you are away from Delhi at the moment, I am forwarding a copy of this letter and relevant papers to Dr Roy and Dr Gulati.

With best regards,

Yours sincerely,

(K.P.A. Menon)

Dr M. S. Swaminathan,
Director,
I.A.R.I.,
New Delhi

DIRECTOR
I. A. R. I.
No. PA/178.
Date..13.1.67

271
9/1/67

chd 4
17/1/67

Registration

Pl. get the information from Drs. Roy & Gulati. They may consult other Divisions also

14/1

Rego

heads 2
Dr Roy has forwarded Dr Gulati & has asked for info from Drs by 20/1. He will be in town to meet by 23/1
RF 21/1/67
14/1

I.C.A.R.

We should have a meeting some time with Director, I.A.R.I., to discuss the Seminar to bring together at a meeting agricultural scientists and industrialists. The proposal was approved by Minister (F & A) and I think the papers have been sent on to Director, I.A.R.I.

B.P. Pal
(B.P. Pal)
14.11.1966

Secy.

Director, I. A. R. I. may be per

[Signature]
25/11/66

Some of the items which can be discussed at the proposed meeting between agricultural scientists and industrialists together with a draft of a letter which could be sent to industrialists are enclosed. I suggest that Dr.S.E. Roy, Head of the Division of Agricultural Engineering and Dr.K.C. Gulati, Head of the Division of Agricultural Chemicals may be nominated as scientific Secretaries of the Seminar.

M.S. Swaminathan
(M.S. Swaminathan), 31/12
Director: IARI
30.12.66

Secretary: I.C.A.R.
I.A.R.I., U.O. NO. 5-OMV Dated 2-1-67

D. G. may please abstract of this & further action may be taken.

This is all right as a starting point. We would have to be specific re. the items to be discussed & choose the industrialist invite accordingly. We will also invite Dept of Agric, Dept. of Ind, Dept. of Atomic Energy & CSIR to nominate a few representatives.
B.P. Pal
9.1.67

By No. 7275/66
Dated 14/11
Secy (ICAR)

7097/DG/66
14/11

By No. 34/67
Dated 2/1
Secy (ICAR)

24/12/67
9/12

Secy

SEMINAR ON "INDUSTRY AND AGRICULTURAL RESEARCH"

| Sl.No. | Division | Suggested Items | Work already done & stage of Progress | Papers to be prepared and ready by | Persons/firms to be invited |
|--------|--|--|---------------------------------------|------------------------------------|--|
| 1. | Plant Introduction (Shri H.B.Singh) | Substitutes for imported oats, imported hops, leather tannins, roots of chicory crops grown from imported seeds; palm-sugar and palm gur vs. cane sugar. | | | |
| 2. | Soil Science & Agricultural Chemistry (Dr. N.P.Datta) | <ol style="list-style-type: none"> 1. Utilization of wastes for manures and feeds. 2. Utilization of basic slag for plant nutrition. 3. Use of industrial by-products for increasing efficiency of fertilizer use. 4. I.A.R.I. Soil Test Kit 5. Agricultural uses of bentonite 6. Utilization of non-edible oil seed cakes for production of agricultural chemicals and quality proteins. 7. Production of Nicotine sulphate from low grade tobacco and tobacco wastes. | | | <p>Shri M.A.Idnani</p> <p>Dr. N.P. Datta</p> <p>Dr.B.V.Subbiah</p> <p>Dr.M.S.Khera</p> <p>Dr.B.Ramamoorthy</p> <p>Dr.K.C.Gulati</p> <p>Shri M.A.Kidwai</p> |
| 3. | Agricultural Physics (Dr.C.Dakshinamurti) | <ol style="list-style-type: none"> 1. Tensiometers, Pressure membrane apparatus etc.(import substitution) 2. Radiation Recorder (Import substitution) | | | |

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- 4. Entomology
(Dr.S.Pradhan)
 - 1. Neem Seed Kernel Suspension as repellent against Locust swarms.
 - 2. Diluents and accessories for insecticidal formulation.

 - 5. Horticulture
(Dr.S.K.Mukherjee)
 - 1. Fruit and vegetable preservation industry.
 - 2. Vegetable and flower seed industry (Export Promotion)
 - 3. Flowers, Bulbs, Roses and other flower industry (Export Promotion)

 - 6. Genetics
(Dr.H.K.Jain)
 - 1. Export of high quality seeds of new hybrids and varieties of Jowar, Maize, Bajra and Berseem.
 - 2. Export of superior quality jute through development of new varieties.
 - 3. Breeding varieties of guar with a high gum content.
 - 4. Breeding chilli varieties with a high capsaicine content.
 - 5. Development of long staple cotton.
 - 6. Production of spices(Export Promotion)

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7. Agricultural Engineering
(Dr.S.E.Roy)
1. Tractors and Engines and Ancilliaries.
 2. Agricultural Implements and Machinery
 3. Processing Machinery including Handling, Conditioning Storage & Transport of Agricultural Products (including refrigeration and drying equipment)
 4. Pumps, ~~Dusters~~, Sprinkler and other Irrigation equipment
 5. Tubewell rigs, Pipes, Strainers and Development of Irrigation Resources.
 6. Instrumentation for Agricultural Research & Production.
 7. Sprayers, Dusters & other crop protection equipment.

TENTATIVE
P R O G R A M M E

O U T L I N E

Date & Duration: 1st week, March, 1967
(3 days)

Place: I.A.R.I., New Delhi.

Inauguration

Concurrent Group Discussions:

1. Agricultural Chemicals & Plant Protection
2. Soils, Manures & Fertilizers
3. Agricultural Power & Equipment
4. Seeds & Plant Material Development

Plenary Session

Demonstration (throughout period)

Manufactured Products & Equipment for
Agriculture.

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GS

SEMINAR ON "INDUSTRY & AGRICULTURAL RESEARCH"

Draft letter to

Industries engaged in the manufacture of agricultural inputs and agriculture-based industries

Sirs,

It is intended to hold an All-India Seminar sponsored by the ^{I C A R} ~~Ministry of Food and Agriculture~~ on "Industry and Agricultural Research". The seminar will be held in the first week of March at the I.A.R.I., New Delhi.

The intention of this seminar is to focus ~~the~~ attention ~~of industries~~ on the vast potential for launching ~~out into~~ ^{projects for the} large-scale manufacture of agricultural inputs and ~~into~~ ^{develop new export} industries based on agricultural products. The scope of such industries to develop in the light of recent research in the country is extremely great. Many industries already ^{engaged in the} ~~in~~ production of ~~various~~ chemicals, weedicides, pesticides, insecticides, plant extracts, processed food and related ancillaries, ~~tractors~~ ^{tractors}, agricultural implements and machinery, can ~~launch out into~~ ^{develop} new ~~related~~ avenues of production taking up unused capacity. There is also much scope for industries to develop altogether new lines of production based on or serving agriculture.

It has been the concern of the Government that industry in the country has been largely consumer oriented thus far and serving mainly further industrial production and the urban populus. Unless industry turns to the service of agriculture in which there is phenomenal scope for expansion, it is not likely that ~~the~~ country will rapidly overcome the severe food shortages.

^{A tentative agenda is enclosed}
It is requested that you ~~may~~ kindly indicate whether you would be interested in sending ~~the~~ ^a representative ^{the name of your representative who would} of your firm to participate in the proposed seminar on "Industry and Agricultural Research" ^{may please be} communicated by 31-1-67. Yours faithfully,

Director Secy.
I.A.R.I. I.C.A.R.

Introduction of the Norin dwarfing
genes in wheat breeding

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It is now clear that fertilizer response is more a morphological than a physiological problem and that unless the plant has a morphological frame which enables it to resist lodging, the application of fertilizers and water in the quantities required for high yields is not possible. If the variety is not tailored to the needs of high fertility conditions, the yield may even tend to get depressed with the application of nitrogen doses exceeding about 40 Kgs N per hectare. A short, non-lodging habit is hence a pre-requisite for introducing a new agronomy capable of enhancing yields. Several dwarfing genes were known for a long time in wheat, such as the S or C loci which govern the Sphaerococcum and Compactum characteristics respectively. These loci, however, old had a pleiotropic effect on the ear, making it very dense and compact. The first variety which appeared to have the desired combination of short plant height, lodging resistance and kernel type was Norin 10 (Vogel, C.A., Craddock, J.C., Muir, C.E., Everson, E.H. and C.R. Rohde, 1956, *Agron. Jour.* 48 :76-78). This variety was one of a collection of Japanese wheats brought to the United States by Dr. S.C. Salmon in 1948.

Using the Norin dwarfing genes, the dwarf winter wheat variety, Gaines, was developed by Dr. Vogel in the Washington State, United States. Spring wheat varieties had been developed in Mexico by Dr. N.E. Borlaug, using the Norin genes for dwarfing (three independent genes have so far been found).

In order to develop dwarf wheat varieties suitable for cultivation in India, the Indian Agricultural Research Institute, New Delhi, introduced in 1963 a large variety of wheat material containing the Norin dwarfing genes from Mexico through the courtesy

of the Rockefeller Foundation and the Mexican Ministry of Agriculture (Swaminathan, M.S. 1965. IARI P.G.School Journ. 3 :57-62). In addition to breeding material, bulk quantities of four commercial Spring Wheat varieties - Lerma Rojo 64A, Sonora 63, Sonora 64 and Mayo 64 were also obtained. These varieties were tested in all the wheat growing States of India during the rabi seasons of 1963-64 and 1964-65 under the All-India Wheat Improvement Project. In addition, they have been subjected to detailed physiological, pathological, chemical and agronomic tests at the Indian Agricultural Research Institute. Two of these varieties, Lerma Rojo 64A, and Sonora 64 were approved by the Central Variety Release Committee of the Indian Council of Agricultural Research in 1965 for cultivation in irrigated areas.

Lerma Rojo is a late variety with a high degree of resistance to yellow rust. It performs very well under timely sown conditions and in areas characterised by yellow rust epidemics. Sonora 64, on the other hand, is an early variety and is well suited for being grown in rotations like maize-wheat, potato-wheat, rice-wheat, etc. It is the most lodging resistant variety so far developed. Being early, it is a safe variety for cultivation under high fertility conditions in the eastern part of U.P., Bihar, West Bengal, Rajasthan, Madhya Pradesh, Gujarat, Maharashtra and Orissa. Sonora 64 should not be sown before the middle of November in areas where the normal sowing time is late October or early November. It is susceptible to yellow rust and hence is not recommended for areas where yellow rust appears in an epidemic condition.

Characteristics of Lerma Rojo and Sonora 64

+ Disease resistance: Resistance to individual races of rusts was studied at the Division of Mycology and Plant Pathology of IARI and it was been found that Sonora 64 possesses resistance to 12 races each of black and brown rusts and four races of yellow rust.

It is susceptible to loose smut and hence in seed farms the seeds should be treated against smut infection. Lerma Rojo is resistant to 8 races of black rust, 6 races of brown rust and 7 races of yellow rust.

Lodging resistance: Sonora 64 has two genes for dwarfing, while Lerma Rojo has only one such gene. As a consequence, Sonora 64 has a very high degree of resistance to lodging.

Growth Pattern: Detailed studies of growth and development in the dwarf wheats have shown that Sonora 64 produces only 6 to 8 tillers all of which come to maturity synchronously. Using a seed rate of 100 Kilograms per hectare and four to five irrigations, yields of five to six tons per hectare have been obtained. The synchronous tillering habit enables this variety to make an effective use of the fertilizer and water applied.

Biochemical characteristics: The protein and other quality characteristics have been studied in detail. On an average, the protein content of the grain was found during 1964-65 to be 14.6 percent. While Lerma Rojo is a soft wheat, Sonora 64 has strong gluten and has good chapstee-making qualities. When N is in abundant supply, irrigation during grain development does not lead to mottling of grains. The grains have a red colour.

Agronomic and cultural requirements: The dwarf wheats showed a very poor stand at several trials, The seeds showed 100 per cent germination in petri dishes but the emergence of the seedlings in the fields was poor. It was seen that this was due to the deep sowing of the seeds which the tall varieties tolerate, but the dwarfs do not. The dwarf strains have a short coleoptile, which is unable to penetrate a long distance if placed deep. Sonora 64 is particularly affected by the type of sowing practised by our farmers, who often sow wheat at a depth of four to six inches so as to place the seeds in the region of the soil which has adequate moisture. If a

pre-sowing irrigation is given, there will be enough moisture in the upper strata of the soil and the seeds can be sown at a depth of two inches from the surface. Under such conditions, germination and tillering of Sonora 64 and Lerma Rojo are excellent. Irrigations prior to sowing and during grain development (February and March) are exceedingly important for realising the full yield potential of this variety. The maximum temperature during March at Delhi ranges from 29 to 32°C and at this time usually hot dry winds occur. While the normal varieties will lodge if an irrigation is given under such conditions, the dwarfs can be safely irrigated.

Yielding ability: The yield tests conducted during 1964-65 have confirmed the expectations these varieties raised during 1963-64. Lerma Rojo, because of its higher degree of yellow rust resistance has been found to do well in parts of Punjab and U.P., where yellow rust is a problem. Sonora 64 does very well in all areas where yellow rust is not a problem. At Delhi and Dohad (Gujarat), a yield of 6.4 tons per hectare was obtained with this variety during 1964-65.

New selections: Varietal diversity as well as a rapid replacement of varieties are essential for sustaining high wheat yields over many seasons. From the advanced generation material sent by Dr. N.E. Borlaug in 1963, several selections such as S.227 and S.307 have been found to perform very well in the Northern Plains Zone. Both these strains have amber grains and a high yield potential. The highest yield in national demonstrations in 1965-66 was obtained with S.227, which yielded 68 quintals per hectare in a farmer's field in the Punjabkhod Village of Delhi State. S. 307 is a derivative of a cross involving Lerma Rojo and the Japanese dwarf strain Norin 10-B. S.307 has superior rust resistance. The original stock of S.227 received from

Mexico segregated for resistance to brown rust and selections have been made for resistance. Seeds of S.227 and S.307 were multiplied at Wellington in the Nilgiri Hills during the summer of 1966 and these varieties are undergoing extensive yield tests.

Besides the selections made at the Indian Agricultural Research Institute, valuable selections were made at Ludhiana, Pant Nagar and Durgapura in the dwarf material sent to them. At Ludhiana, two selections PV.18 and S.227 have been found to do well. Selections for brown rust resistance have been made in S.227 at Pant Nagar.

Crosses between the dwarf wheat material from Mexico and promising Indian varieties were made in 1963 and several of the hybrid derivatives hold great promise for a further improvement of the yield potential and quality of wheat. Through induced mutations the grain colour of Sonora 64 and Lerma Rojo have been changed from red to amber. The quality and quantity of protein in these varieties have also been considerably improved (G. Varughese and M.S. Swaminathan, 1966, Curr. Sci. 35, No.18 : 469-470).

Nearly 400,000 hectares were sown with dwarf wheat varieties during the rabi season of 1966. Arrangements have been made to supply fertilizers in adequate quantities for this area and it is expected that the cultivation of such non-lodging varieties in conjunction with suitable agronomic practices would help to double India's wheat production within the next five years.

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