

b2. Effect of shading on the performance of several local and improved soybean varieties (1987-1988)

To determine the effect of shading on vegetative growth and yield of local and improved soybean varieties.

The experiment was conducted at Cikeumeuh Sub Station by using local and improved varieties. The experiment is still in progress and it will be harvested in January 1988. The net which could reduce 25-30% light intensity was set in different growth stages, namely from planting to flowering, from flowering to maturity and from planting to maturity.

Researchers : Ir. Endang S. MS
Drs. Rasyid Marzuki MSc
Ir. S. Hutami MS
Drs. Sutarto
Ir. Djuber Pasaribu MSc
Dr. H. Yarimizu

b3. Photoperiodism on several local and improves soybean varieties (1987-1988)

To detect the day length affect on growth and yield of several local and improved soybean varieties.

Pot experiment was conducted in the green house by using Latosol soil from Muara Sub Station. Ten varieties of local and improved varieties were sown on mid November 1987.

Researchers : Drs. Sutarto
Ir. S. Hutami MS
Drs. Rasyid Marzuki
Ir. Djuber Pasaribu MSc
S. Okuda
Dr. H. Yarimizu

3. Improvement technique of physical and chemical properties of soil (1986-1990)

To find out and develop technique to improve the physical and chemical soil properties.

a. Amelioration techniques of acid soil (1987-1990)

Study the effect of coarse granular limestone and dolomite application, which can maintain the effectiveness for 5 to 10 years, once it is applied. Furthermore, through the utilization of low cost and low rate of coarse granular supply of dolomite, economically larger effect of improvement on soil acidity can be expected.

a1. Increasing soybean yield through improving acid soil by the use of coarse ground calcite and dolomite (1987-1990)

To study the long term effect of dolomite and limestone and the effect on soil fertility and soybean yield.

Long term of pot experiment will be conducted at Cikeumeuh Sub Station. Because of budget problem, the experiment was delayed.

Researchers : Drs. Rasyid Marzuki MSc

Ir. Endang S. MS

Ir. S. Hutami MS

Ir. Djuber Pasaribu MSc

Drs. Sutarto

Dr. H. Yarimizu

b. Technique to increase soybean yield by effective use of soil moisture (1986-1990)

To find out the techniques and study the factors that could increase soybean yield through the effective use of soil moisture.

b1. Response of soybean varieties to soil moisture saturation and molding (1986-1987)

To study the response of soybean varieties to moisture saturation and molding. Soil saturation and molding significantly increased the growth and yield of soybean. The benefit of molding and saturation need to be tested in areas with different soil conditions and climate.

Researchers : Ir. Djuber Pasaribu MSc
Drs. Sutarto
Ir. S. Hutami MS
Drs. Rasyid Marzuki MSc
Dr. H. Yarimizu

b2. Effect of saturation, molding and variety on soybean growth and yield (1987-1988)

To clarify the benefit of watering to soil saturation and molding on ten soybean varieties.

Field experiment was conducted at Citayam Sub Station. The experiment was planted on December 5, 1987.

Researchers : Drs. Sutarto
Drs. Rasyid Marzuki MSc
Ir. S. Hutami MS
Ir. Djuber Pasaribu MS
Dr. H. Yarimizu

SHORT TERM EXPERT, 1988-1989

- Research field : Agronomy
- Duration : One month (August - September 1988)

TRAINING, 1988-1989

- Research field : Agronomy (Ph.D degree)
- Duration : Six months (1988)

ENTOMOLOGY

RESULTS

1. Classification of the ecology of insect pests inhibiting germination and their control method (1986-1990)

a. Classification of the injured seeds by insect and their germinability

This experiments was not fully executed yet, but still in the stage of preparation, due to the limited of personal and equipment.

b. Reproductivity of the insect injuring stored seeds in various conditions

Biological reaction of Callosobruchus analis F. on soybean seed from 7 varieties were conducted in the laboratory conditions. Results of the experiment revealed that C. analis most preferred to lay eggs on local variety (black soybean). There was no significant different among other 6 improved varieties (Americana, Lokon, Kerinci, Wilis, Orba and Galunggung). The growth and development of C. analis showed the best in local variety, moderate in Lokon, Kerinci, Wilis, Orba and the worst in Galunggung and Americana. The experiment will be continued particularly in relating to different physical conditions.

Researchers : Ir. Nono Suyono
Dr. T. Okada.

2. Ecology of the major insects infesting soybean plants and their economical control methods (1986-1990)

a. Recognition of the major pests of soybean at various localities

Survei of soybean pests were conducted in Sumatera, Java, Bali and South Sulawesi. The data available so far were obtained from Lampung and Java. At least there were 17 insect pests and many natural enemies associated to soybean plants. Among the major insect pests are M. sojae, O. phaseoli, L. indicata, Aphis sp, B. tabaci, S. litura, C. chalcites and Etiella spp.

This survei should be continued to find complete information related pest and natural enemies, cropping pattern, farmer practices in different soybean areas.

Researchers : Ir. Wedanambi Tengkan MS.

Dr. Budihardjo

Ir. Nono Suyono

Ir. Toto Djuwarso MS.

Ir. Harnoto MS.

Dr. T. Okada

b. Establishment of field survei technique for insects

The study was conducted at Jabung (Lampung) in 1987. From the study of spacial distribution of major soybean insects showed as follows :

- Aphis glycine was observed during the whole growth period of soybean and has an even distribution horisontally among the plants. About 90% of the population of A. glycine were found within 2/3 of upper part of the plant particularly on the leaves of main stem.

- Bemisia tabaci was found in even distribution horizontally among the plants. Up to 50 days of plant age, 93% population of B. tabaci was found within 2/3 of lower part of plants. After 50 days the distribution shifted vertically to 2/3 of upper part of the plants.
- The study should be continued in more specific aspects related to the sampling technique included the information for other soybean pests.

Researchers : Dr. Budihardjo
 Ir. Toto Djuwarso MS.
 Ir. Wedanimbi Tengkan MS.
 Dr. T. Okada

c. Classification of insects particularly natural enemies on soybean

The natural enemies of soybean-insects were collected from field experiments and farmer fields during the survei.

Most of the parasitoids were belong to the group of Hymenoptera, while the predators comprise many group of Coleoptera, Diptera, Neuroptera, Hemiptera, Ódonata and spiders. Many specimens need correct identification.

From the intensive survei on egg parasitoid of soybean bugs was found 8 egg parasitoids. The degree of parasitism showed somewhat higher in many locations (50 - 90%). There are two egg parasitoids attacked N. viridula, 3 species attacked P. hybneri and R. linearis.

This study will be continued for several coming seasons to clarify the host-natural enemies relationships and for other potential natural enemies.

Researchers : Ir. Wedanambi Tengkan MS
Dr. Budihardjo
Ir. Toto Djuwarso MS
Dr. T. Okada

d. Establishment of production technique of major pests and their natural enemies

Spodoptera litura and Chrysodeicis chalcites have been reared in the laboratory using natural host plant.

The results showed that S. litura can be reared in the laboratory using the natural host plant.

The possibility using artificial diet has been trying. However rearing of C. chalcites was not satisfied due to the infection of diseases.

This study should be continued to improve the methodology and to other major insect pests.

Researçhers : Ir. Toto Djuwarso MS.
Ir. Harnoto MS.
Dr. T. Okada

e. Phenological analysis between the major pests and their host plant

The experiments were conducted in soybean areas of Lampung, Bogor, Yogyakarta and Mojoseri (East Java) ini 1987. Soybean variety Raung was planted in Lampung and Yogyakarta, variety Wilis were planted in Mojoseri and variety Wilis, Orba and No. 29 were planted in Bogor.

The results indicated that beanfly Ophiomyia phaseoli was found to be the dominant pest attacking at the young stage of soybean plant and then followed by Melanagromyzae sojae.

About 10 to 15 species of insect defoliator were observed in each locations. Among of those defoliators which found in the high population level were Aphis glycine, Bemisia tabaci, Empoasca sp., Lamprosema indicata, Heliothis sp. and Spodoptera litura.

Piezodorus sp. was dominant in Bogor and Lampung, Riptortus linearis was dominant in East Java. Pod-borers Etiella zinckenella was found in higher population than E. hobsoni in all locations. The population of podborers in Bogor and Lampung showed higher than East Java.

Variety No. 29 showed the more tolerant to beanfly and pod-borer insects compared to Wilis and Orba.

This study would be continued in several consecutive cropping seasons in different agroecological conditions.

Researchers : Ir. Toto Djuwarso MS
Dr. Budihardjo
Ir. Wedanimbi Tengkanu MS.
Ir. Made Samudera
Dr. T. Okada

f. Analysis of major pests population in relation to the damage and yield

The experiments were conducted in the Greenhouse condition for beanfly Ophiomyia phaseoli, and in the semifield condition for the army worm S. litura. Various population levels of beanfly eggs and third instar larvae of army worm were introduced to the caged soybean plants.

The experiments have been started in August 1987 for S. litura and in September 1987 for O. phaseoli. The experiment of S. litura was delayed one month due the poor germination of seeds (Orba).

The experiments will be continued in 1988/1989 to clarify the economic threshold of O. phaseoli and S. litura.

Researchers : Drs. M. Arifin M.
Ir. Wedanimbi Tengkan MS
Dr. T. Okada
Dr. Ir. J. Soejitno

RESEARCH PROGRAM, 1988-1989

All experiments related to the ecobiology studies as mentioned in the program of 1987/88 will be continued in the next fiscal year (1988/89), since this type of studies need long run data particularly the relationship of pest population and their bio-physical environments.

SHORT TERM EXPERT, 1988-1989

Short term expert in the field of bio-control and rat specialist are requested.

Time expected in May - July 1988 and December - February 1989.

TRAINING, 1988-1989

Training in the field of research management and research activities related to the utilization and evaluation of natural enemies as bio-control agents.

Time expected in June - December 1988.

PHYTOPATHOLOGY

RESULTS

1. Detection and distribution of seed transmissible viral diseases in soybean producing centres

Presence of (SSV, SMV, CMMV) viruses were examined on seedlings derived from 18 soybean seed samples, collected from Lampung and East Java (A part of local seed collection by Div. of Agronomy) which contained brown-mottled seeds among of them.

SSV were the only virus detected and it was found in 6 samples (3 from Lampung, 3 from East Java).

SSV transmission rate through brown mottle and healthy-like seeds were 16.4% and 3.3% respectively, among seedlings showing any of virus disease-like symptoms, by ELISA.

Problem during the course of research

- Progress of research was greatly delayed than as schedule because of shuffling of counterparts (described in detail in Title 3)
- CMMV-ELISA did not work well probably because of antiserum problem

Plan for 1988-1989

1. The same examinations with previous year will be continued for obtaining more data
2. SSV, CMMV will be collected from farmer's fields too, for preparing samples of strain study in the future

Researchers : Dr. Nasir Saleh

Dr. Y. Honda

Ir. Jumanto MS

Drs. M. Muhsin

Dr. S. Takaya

2. Detection and distribution of seed borne fungal and bacterial diseases in soybean producing centres

About 50 seed samples were collected from Java and Lampung (a part was endorsed from local seed collection by Div. of Agronomy). Purple stain seeds (Cercospora kikuchii) were contained commonly, but the rates were not so high in general. Fusarium spp., Phomopsis spp., Culvularia spp. were fungi commonly observed on decayed seeds at the time of seed germination, but their pathogenicity to young seedlings were weak. Collectotrichum dematium, one of the seed-borne pathogen of soybean was rarely recognized on decayed seeds. Some special technique seemed to be employed for detecting this fungus.

Plan for 1988-1989

About half sample is kept unexamined, so it must be finished within this year. Study of bacteria is to be cancelled because of absence of researcher.

Researchers :

3. The extent of damage due to seed transmissible viral diseases, their biology, ecology, priority and importance (cancelled)

All counterparts scheduled for virus studies could not work because of the following reasons

- Dr. Nasir Saleh : Transferred to MARIF on July, 1987
Ir. Jumanto MS : Left for Japan to enter Hokkaido Univ. (Doctor course) on October 1987
Drs. M. Mushin : Joined training course in Japan from February-September 1987
Ir. Roechan M. : Work on thesis for doctor degree (It was promised that he will join the project after he finished the thesis).

Subject 1 was also carried out by those researchers and we could not extend studies to this subject.

Plan for 1988-1989

Studies on subject 1 is much delaying, so, we cannot initiate this subject in 1988-1989 too.

4. The extent of damage due to seed borne fungal diseases, their biology, ecology, priority and importance

Experimental techniques, mainly on inoculation of Anthracnose were studied and could be developed a fixed method. It was found that symptoms caused by the fungus on several parts of soybean at growing stage were generally mild. Clear symptoms were vein necrosis of leaves followed by leaf curling and small black spots on petioles, stems and pods.

Plan for 1988-1989

In this year, studies will be mainly focused on Anthracnose of soybean. Scheduled titles of experiments are as follows.

1. Evaluation of damage and importance of anthracnose on soybean producing centres
2. Factors affecting infection and sporulation of anthracnose
3. Role of pathogen through seeds as primary infection source
4. Varietal resistance of soybean to anthracnose and survey on existence of race in anthracnose isolates
5. Observation on disease occurrence through infested seed with Cercospora kikuchii

5. Ecology of major soybean diseases

Through a field survey in Lampung, many soybeans of nearly harvesting stage of which roots were completely decayed with the association of Sclerotium rolfsii were observed. It was found that the fungus distributed commonly in upland soil in Lampung, and was confirmed that the fungus caused damping-off of young soybean in moist condition. In another village, severe damage of pod rot was found. Fungus isolated was Rhizobium sp., pathogen test is now in progress

Plan for 1988-1989

1. Evaluation of yield loss by *S. rolfsii* (Field surveys and inoculation tests)
2. Etiological study of pod rot in Lampung
3. Etiological study of new virus-like symptom occurring in Lampung

Researchers : Dr. S. Takaya
 Drs. M. Muhsin

RESEARCH PROGRAM, 1988-1989

1. Detection and distribution of seed transmissible viral diseases in soybean producing centres
2. Detection and distribution of seed-borne fungal diseases in soybean producing centres and their damage, ecology and importance
3. Management of seed to reduce occurrence and prevent spread of fungal diseases in soybean
4. Evaluation of importance of soil-borne pathogens, especially in Lampung provinces
5. Detection and distribution of new viral diseases in Indonesia

SHORT TERM EXPERTS, 1988-1989

Virologiest

TRAINING, 1988-1989

RESEARCH HIGHLIGHT OF ATA-378
(1985-1987)

ENTOMOLOGY

Callosobruchus analis F preferred most to lay eggs on local variety (black soybean). The best growth and development of C. analis was in local variety and the worst in Galunggung and Americana.

Survey of soybean pests was conducted in Sumatera, Java, Bali and South Sulawesi. The major insect pests are Melanagromyza sojae, Ophiomyia phaseoli, Lamprosema indicata, Aphis glycine, Bemisia tabaci, Spodoptera litura, Chrysodexis chalcites and Etiella spp.

Aphis glycine was observed during the whole growth period of soybean. About 90% of the population of A. glycine were found within 2/3 of upper part, particularly on the leaves of main stem.

Up to 50 days of plant age, 93% population of B. tabaci was found within 2/3 of lower part of plants. After 50 days, the distribution shifted vertically to 2/3 of upper part of the plants.

The natural enemies of soybean insects were collected from field experiments and farmer's fields. Most of the parasitoids belong to Hymenoptera, while the predators comprise many group of Coleoptera, Diptera, Neuroptera, Hemiptera, Odonata and spiders.

Eight egg parasitoids of soybean bugs were found. The degree of parasitism was quite high in many locations (50-90%). There are two egg parasitoids which attacked N. viridula, and 3 species attacked P. hybneri and R. linearis.

S. litura and C. chalcites have been reared in the laboratory. The result showed that S. litura can be reared satisfactorily using the natural host plant in laboratory.

The beanfly O. phaseoli was found to be the dominant pest attacking the young soybean plant and then followed by M. sojae.

Among defoliators which found in high population were A. glycine, B. tabaci, Empoasca sp, L. indicata, Heliothis sp and S. litura.

Piezodorus was dominant in Bogor and Lampung and R. linearis dominant in East Java. The population of pod borers E. zinckenella was higher than E. hobsoni in all locations. The population of pod borers in Bogor and Lampung was higher than in East Java.

Variety No. 29 was more tolerant to beanfly and pod borer Etiella compared to Wilis and Orba.

PHYTOPATHOLOGY

Seed borne viral diseases

Soybean stunt virus (SSV), was found from the collected seed samples. SSV transmission rate through brown mottle seeds was 16,4% and it was found in East Java and Lampung. The viral disease will be studied further and more samples will be collected from the soybean producing areas.

Seed borne fungal diseases

Infected seed samples were collected from Java and Lampung. Purple stained seeds (Cercospora kikuchii) were commonly found. Fusarium spp., Phomopsis spp., Curvularia spp. were commonly found on decayed seed, but their pathogenicity to young seedlings were weak. Colletotrichum dematium is one of the seed borne pathogen in soybean causing anthracnose. Its characteristic symptoms were vein necrosis of the leaves followed by leaf curling, and small black spots on petioles, stems and pods. Inoculation technique will be developed in the next fiscal year. Research activities were focused on the following points:

- a. Evaluation of damage and importance of anthracnose on soybean producing area.
- b. Factors affecting infection and sporulation of C. dematium.
- c. The role of pathogen through seeds as primary source of inoculum.
- d. Varietal resistance of soybean to anthracnose.
- e. Observation on the disease occurrence of Cercospora kikuchii through infected seeds.

Fungal soil borne diseases

Sclerotium rolfsii causing damping-off of soybean seedlings was commonly found in Lampung area. Another important fungal pathogen was Rhizoctonia sp. Studies were focused on:

- a. Evaluation of yield loss caused by S. rolfsii.
- b. Etiological study of pod rot in Lampung.

PLANT PHYSIOLOGY

Yields of several crops, namely corn, sweet potato, soybean, peanut, and lowland rice were compared under no fertilizer and optimum rates of fertilizers at Citayam research station in 1987 dry season. The highest response was corn (74.7%), followed by IR36 lowland rice (28.4%), sweet potato (28.3%), and Cisadane lowland rice (21.7%). Soybean and peanut ~~showed~~ showed no response. The yields under no fertilizer were 3.28, 22.6, 1.05, 3.33, 5.61 and 4.44 t/ha, respectively for corn, sweet potato, soybean, peanut, Cisadane and IR36. Under optimum fertilizers the respective yields were 5.73, 29.0, 1.09, 3.29, 6.83 and 5.70 t/ha. The growth pattern and nutrient distribution during plant growth for each crop are still analyzed.

The methods of lime and phosphate application, namely shallow or deep incorporation and spot placement and their interaction were compared on Arjuna corn in the greenhouse. Incorporation of lime and phosphate as deep as 20 cm is the best in term of plant growth. The yield and root distribution are not yet recorded.

After eleven months soybean seed storage at a mountain cave in Ciampaa, the germination percentages was still more than 80%. Storage at Cimanggu, the germination percentages after 11 months was less than 40%.

Observation on soybean seed storage under farmer's condition have been done in Garut. From the sample collected, about 85% had good germination and less than 15% the germination percentage was below 80%. From 40 farmers, only 6 farmers have more than 13% moisture content.

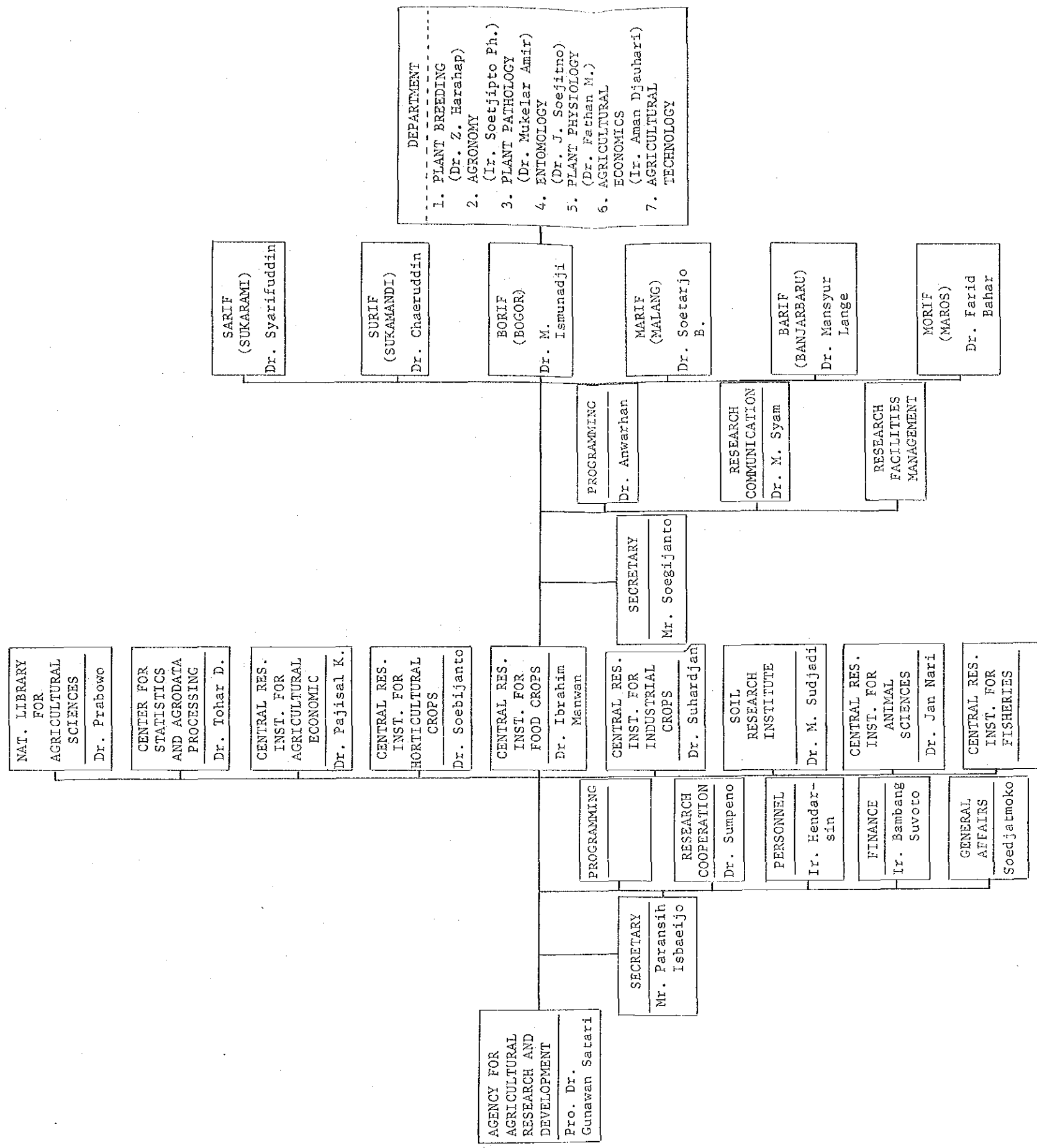
From 17 regions in East Java 56 Rhizobium isolates were obtained and from 10 regions in Lampung 38 isolates. Most of them are slow growing Rhizobium.

ACRONYMY

Five improved soybean varieties, i.e. Galunggung, Orba, Lokon, Wilis and Kerinci were tested in monocrop and intercrop with corn at Cikeumeuh Sub Station. Basal fertilizer of 25-45-50 for soybean were applied at planting time, while for corn the rate of fertilizer was 60-45-50. Results showed that total seed weight of soybean in monocrop was not different from that of intercropping. However, there was a tendency that total seed weight of monoculture was higher than that of intercropping. Seed weight obtained from the middle rows were higher and significantly different compared to the adjacent row of corn. Among five varieties, Galunggung and Lokon produced lower filled pods in both monoculture and intercrop, but it was not significantly different.

Field experiment conducted at Citayam Sub Station in 1986, indicated that soil saturation and molding significantly increased the growth and yield of soybean. The benefit of molding and saturation need to be tested in several areas with different soil and climate conditions. To obtain high efficiency of water use and molding several experiments to test the techniques of making canals and molding are needed.

資料 9 農業研究開発庁 CRIFC·BORIF 組織図



JICA