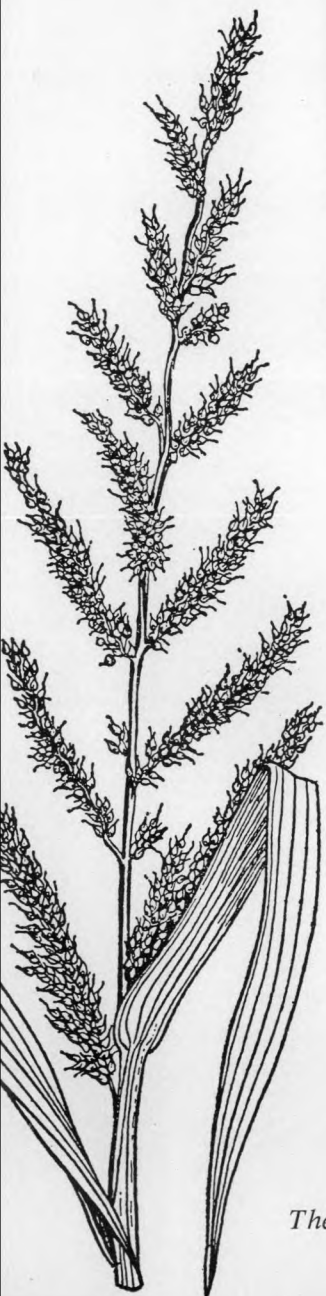


**PROCEEDINGS OF THE  
FOURTH ASIAN-PACIFIC  
WEED SCIENCE SOCIETY  
CONFERENCE**

**ROTORUA, NEW ZEALAND  
MARCH 12 TO 16, 1973**

**Volume 3**





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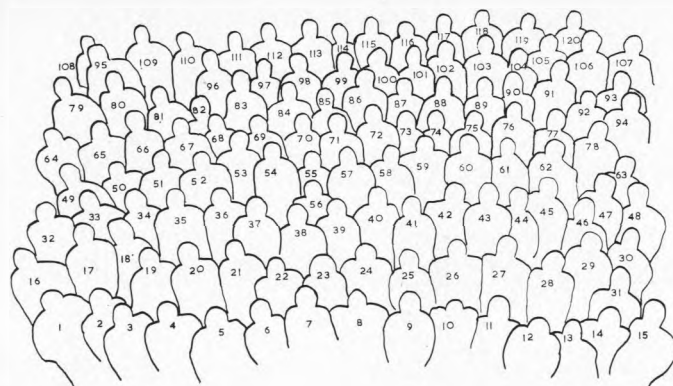
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## ERRATA

- p. 207, Table 3: The first column (Treatment, kg/ha) should read: MCPA 4.0, paraquat 0.98, amitrole 4.0, prometryn 2.0.
- p. 208, line 9: rate of paraquat should read: 0.7 to 1.0 kg/ha.
- p. 348, line 31: "As populations of 23 to 28/m<sup>2</sup> . . ." should read: "As (viable) populations of  $(23 \times 28) \times 10.8^2/\text{m}^2$  . . .".

# PRESENT AND FUTURE BIOTROP RESEARCH AND TRAINING IN WEED SCIENCE

MOHAMAD SOERJANI

*SEAMEO — Regional Centre for Tropical Biology (BIOTROP), Bogor,  
Indonesia*

## INTRODUCTION

BIOTROP (Regional Centre for Tropical Biology) has been established by SEAMEO (Southeast Asian Ministers of Education Organization) to contribute to the economic development of the Southeast Asian Region by identifying and solving critical biological problems. In order to reach this objective, BIOTROP has mission-oriented research and training programmes in selected areas. These programmes enable BIOTROP to train regional scientists in developed methodology and principles of the research areas and to translate knowledge into action programmes through collaboration with appropriate regional universities and other organizations as well as through seminars and other forms of exchange of scientific information.

The three programme areas are on Tropical Forest Biology, Tropical Aquatic Biology and Tropical Pest Biology.

After serious deliberation by a regional task force and BIOTROP's Governing Board, it was decided that the Tropical Pest Biology Programme will have five projects, namely, Weed Biology, Ectoparasite Biology, Pesticide Ecology, Small Mammals Biology, and Storage Pest Biology.

This paper is aimed at reviewing and evaluating the past and present activities of BIOTROP in weed biology in particular, weed science in general, and discussing BIOTROP's future programmes in weed science research and training.

## BIOTROP'S FIVE-YEAR PROGRAMME

A few years ago in 1970, with a very constructive guidance of Dr W. van der Zweep (I.B.S., Wageningen) a preliminary outline of research and training activities of BIOTROP in weed science in general and weed biology in particular was drawn. The outline was then reviewed for comments and suggestions by eminent weed experts such as Mr J. D. Fryer (Director of

W.R.O., Oxford) and Dr W. R. Furtick (at the time when he was Director of I.P.P.C., Oregon).

Based on this outline, a Task Force Meeting on Weed Biology was called by BIOTROP on 2-3 October, 1970 at Bogor, in which participants from Malaysia, Thailand, Philippines and Indonesia were present. The meeting recommended that BIOTROP start with a nucleus of activities in Weed Biology. Prof. R. van der Veen of the Dutch Working Group on Tropical Weed Control has shared his vast experience and discussed possible efforts of the said group with BIOTROP.

In November 1970 Prof. Makoto Numata (the present President of the Weed Science Society of Japan) was sent by the Japanese Government to attend the Fourth BIOTROP's Governing Board Meeting at Singapore. He participated in a very useful and encouraging discussion considering BIOTROP's weed science programme.

Mr J. D. Fryer came to Bogor in January 1971 and again in January 1972 to assess weed problems in Southeast Asia and to discuss possible implementation of BIOTROP's Weed Biology Programme and in what ways that BIOTROP might receive technical assistance from W.R.O. and other institutions in the U.K.

Reviews and discussions on BIOTROP's programme were made by several consultants from several institutions who subsequently visited Bogor — *e.g.*, Dr G. W. Ivens (W.R.O. Oxford, July, 1971), Dr W. van der Zweep (I.B.S., Wageningen, May, 1972), Dr L. C. Burrill (I.P.P.C., Oregon, April, 1972), Dr D. L. Plucknett (Univ. of Hawaii, Honolulu, April, 1972), Dr M. R. Vega (U.P.C.A., Los Banos, January, 1972), Mr Prachern Kanchanomai (Rice Department, Bangkok, January, 1972), Dr J. C. Caseley (W.R.O., Oxford, November, 1972), Mr L. Kasasian (W.R.O., Oxford, April, 1972 and November, 1972).

Lastly, the programme was reviewed again on 17-22 July, 1972 by a Task Force Meeting at Bandung. After a very careful consideration, the Weed Biology programme was formulated and completely fitted into BIOTROP's overall 5-year Development Plan together with the other projects/programmes.

With the concurrence of the Governing Board in its Eighth Meeting at Bandung in December, 1972, the 5-year Development Plan was submitted to and accepted by the SEAMEO Ministerial Meeting at Phnom Penh last January, 1973. Consequently BIOTROP will enter its permanent operational phase on 1 July, 1973. However, during its interim period, BIOTROP has launched



some preliminary activities in the various programmes, including weed biology. The following section reviews in brief BIOTROP's past and present activities during the period 1970-2.

## PAST AND PRESENT ACTIVITIES

### 1. RESEARCH. A BRIEF REVIEW

To date there is only one permanent staff member within the Weed Biology Project, and one senior weed scientist from the Netherlands seconded for a one-year period (1972-3). The research work is primarily done by a botanist from the University of Utrecht preparing his doctorate thesis, by three part-timers and a number of research scholars from SEAMEO member countries: Philippines, Thailand, Vietnam, Laos, Khmer and Indonesia.

#### *Identification and Inventory Work*

*Preparation of weed species identification sheets* (S. Wirjahardja). A non-specialist in taxonomy is faced with a bewildering array of weed species, so one needs to assist him correctly identify species as rapidly and efficiently as possible. The need for constant revision and up-dating of material argues against ordinary printing processes and the accumulation of large stocks of prepared sheets.

One-page diagnostic sheets have been produced for some important species with the name printed at the top of the sheets along with necessary coding information for rapid sorting and retrieval. The rest of the page is devoted to a concise statement of the diagnostic characteristics of the species, information on ecology, distribution, economic importance and possible control recommendation.

To complete the information necessary for this species identification sheet preparation, special work has been started to study seedling characteristics of some important weed species (R. E. Nasution). The work is also aimed at preparation of a key for weed seedling identification.

*A weed inventory in specific areas* (S. Wirjahardja, R. E. Nasution, A. R. Hanafiah, Libor Sisombat and Hang Sathal). The identification of weed problems through inventory methods are in a particular system an urgent step prior to further development and implementation of weed control practices. In a mechanized rice field in North Sumatra sample plots of approximately 5% of the total area and a survey done by walking around two

or three times was quite sufficient to determine the abundance of weed species present in the area. It was clearly seen that *Monochoria vaginalis*, *Limnocharis flava*, *Echinochloa colona*, *Jussieuia linifolia*, *Murdannia nudiflora* and *Fimbristylis miliacea* were quite frequent in this ricefield.

Another survey was done at the River Brantas Multipurpose Project in East Java in the catchment area of man-made lakes prior to inundation. One of the lakes, Karangates, with 1500 ha of water surface was found facing a very serious aquatic weed problem of *Salvinia auriculata*, *Eichhornia crassipes* and *Pistia stratiotes*. Most of the shore-line of the lake is bordering ricefields heavily infested by *S. auriculata*. These surveys were followed by preventive actions by the managers of the projects to prevent the invasion of these weeds into the lakes.

A team of research scholars are now engaged in developing the methodology of weed inventory work in irrigated ricefields in the Bogor vicinity.

### *Autecological Studies*

*Imperata cylindrica*. Research works covered the following aspects. Root competition studies (J. H. H. Eussen) comprised an investigation on the importance of allelopathic value (AV) of *I. cylindrica* in the total competition value (TCV) of the plant. Work is also done to identify the allelopathic substance released by alang-alang.

Pioneer plants in secondary forest establishment with special reference to the role of *I. cylindrica*, will be the title of a paper prepared by S. Wirjahardja and J. H. H. Eussen for the Second Indonesian Weed Science Conference in April 1973.

Crop competition in *I. cylindrica* (U. Suwunnamek) was the subject of a preliminary study to find competitive crops to alang-alang under Bogor conditions. It was found that, among annual crops, sweet potato gives a satisfactory coverage and depresses the emergence of alang-alang tillers considerably. Among legumes, *Centrosema plumieri* was best to cover and suppress alang-alang.

A study of the biology and control of alang-alang (R. Suwanketnikom and P. Danmanondha) resulted in the suggestion that carbohydrate content of the rhizome is correlated with rhizome bud sprouting. Carbohydrate analyses of the rhizome were quite useful in screening efficient herbicides to control alang-alang. Other works covered studies on the fate of one dominant shoot in a more-than-one-shoots-rhizome fragment, the effect of

soil aggregate, soil pH and light intensity of bud sprouting and shoot development.

*Cyperus rotundus*. Work on some aspects of biology of *C. rotundus* (Miss J. N. Sierra and A. H. Sumintapura) covered study of the growth rate, biomass production, production of various bulbs (tubers), effects of various factors such as light intensity, storage of bulbs, bulb sizes, different depth of planting, growth regulators, etc.

*Striga asiatica*. This was a preliminary study on the occurrence of this parasitic weed (S. Slamet). It is interesting to note that *S. asiatica* was only found parasitizing *Axonopus compressus* in Bogor area. Cross-inoculation study so far has revealed that *A. compressus* is one of the most specific hosts of this parasitic weed.

*Salvinia auriculata*. The study (Nguyen-van-Vuong and T. Sumartono) resulted in information about the present spread of *S. auriculata* in Java and South Sumatra. The three species of *Salvinia* so far introduced to Indonesia have the following order of dominance: *S. auriculata* > *S. cucullata* > *S. natans*. It should be noted that this was also their order of introduction to this part of the world. *S. natans* was first introduced, followed by *S. cucullata* and lastly by *S. auriculata* (1951).

Higher water hardness (Ca) was found to facilitate better growth of *S. auriculata*. It was suggested that this is due to the consumption of calcium by the plant.

It was claimed that, although *S. auriculata* caused some influence on rice growth, the differences were non-significant. In an experiment, however, clean plots gave 21.3% higher yield than plots with *S. auriculata* during the entire 15 weeks.

Since this weed also endangers the newly built man-made lakes (Karangkates and Selorejo), practical control recommendations to the lake authority are becoming a pressing need. A most essential alternative might be mechanical traps for the weeds in water flows prior to entering the lakes. Another possible alternative would be to convert the inundated ricefields around the lake, which act as a continuous source of the water fern, into dry-cultivation. An idea of planting calcicophylic trees\* to reduce calcium content of the water percolated into the lakes should also be tried.

---

\*Among others: *Swietenia macrophylla* (Meliaceae), *Acacia auriculiformis*, *A. villosa*, *Leucaena glauca* (Mimosaceae), *Dalbergia latifolia* (Papilionaceae) and *Schleichera oleosa* (Sapindaceae).

*Eichhornia crassipes*. So far, little has been done by BIOTROP to study this important weed species. The effect of various factors on the survival and growth of water hyacinth was observed by C. Santiago.

It was claimed before that, because of the triheterostyle system of the flower of water hyacinth found in Indonesia, seed formation must be impossible. Recent work (A. Djalil) revealed that this is not true; obviously natural pollination might occur and consequently seeds can be produced. Seed germination and seedling studies are now under way.

*Azolla pinnata*. Other work done was to study *Azolla pinnata* and its capability in assimilating large amounts of gaseous nitrogen and small amounts of combined nitrogen (nitrate-nitrogen). This work was done by Ngo-gia-Dinh, who also studied the effect of *A. pinnata* in various conditions (such as nitrogen level of the water) influencing rice growth and yield.

## TRAINING

Several training courses in weed science have been conducted by BIOTROP. The objectives of the courses were to describe the current weed problem in Southeast Asia in particular and in other parts of the world in general, to stimulate and set up guidelines for the initiation of a weed research and weed management programme, to refresh knowledge on the current status and development of weed control, and to stimulate exchange of ideas among weed experts in the region and their lecturers. It was also hoped that there would be a "multiplier" effect, and that the trainees will develop their interests in weed science and initiate local weed science training courses.

The first course was conducted at Bogor for a period of 5 weeks (April-May, 1972). Subjects taught were weed biology (identification, competition, etc.), weed control (mechanical, cultural, ecological, biological, chemical control), aspects of chemical weed control, weed research methodology and other subjects (socio-economic aspects, regulatory aspects, toxicology, etc.). The course consisted of a total of 90 hour lectures and 2 hours of practicals. Participants were 32 persons, consisting of 14 grantees from SEAMEO member countries (Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam; no participant yet from Laos and Khmer), 11 paying participants and 7 observers. The lecturers were from the region (8), the Netherlands (5), U.S.A. (2), U.K. (2), and Australia (1). The

invited lecturers were highly qualified weed scientists from different parts of the world with considerable authority and expertise, so that the course was one of the successful achievements of BIOTROP. The lecture notes comprise comprehensive information on weed problems, control principles and practices.

The programme committee of the second course was preceded by Ir. W. de Groot (Dutch visiting expert) and aimed at training people in the identification and inventory of weeds. It was a 4-week training course (November-December, 1972) with 36 hours of lectures and 95 hours of laboratory and field practical work. Scholarships had been awarded to 18 participants from all SEAMEO countries (including Laos and Khmer who had not previously sent participants to any of BIOTROP's activities), 9 paying participants and 5 observers (total 32 participants).

## FUTURE PROGRAMME

### 1. STAFFING

As BIOTROP will start with its Five-year Development Plan commencing 1 July, 1973, the most essential step is to have its projects staffed. The original idea of having a regional tropical biological centre was based on the existing facilities in the region; it is therefore a basic principle that there will be only a limited number of staff working at BIOTROP. This limited number of BIOTROP staff will collaborate intensively with existing appropriate research and educational institutions in the region for mutual benefit. There will be two scientists recruited in 1973-4 for the Weed Biology Project and another one in 1975-6. The closely related project, Pesticide Ecology, will have only one staff member in 1974-5 and another one in 1975-6. A laboratory head for in-house programmes will be recruited also in 1973-4. Two vacant posts for regional scientists, a plant physiologist and a plant taxonomist (Ph.D. or M.Sc. holder), are now advertised. Since there will be a strong emphasis on aquatic weed problems, a sub-project will be formed; consequently one or two additional staff members will be recruited.

### 2. FUTURE RESEARCH

The basic objectives of BIOTROP's weed research programme are correctly identified weed problems and the establishment of effective and safe control practices to overcome these problems.



Therefore, it is most essential that a research programme should be developed that leads toward a better understanding on the biological aspects of weeds and the extent of losses they cause to human welfare (in agriculture, transportation, industry, health, recreation, etc.). A complete life-cycle study is needed to determine stages or systems that are most vulnerable to control measures.

Based on these considerations, future research activities will comprise the following:

#### *Compilation of Data on Southeast Asian Weed Flora*

Acknowledging the comprehensive work of Drs Holm, Plucknett and Pancho in compiling the flora of the world's worst weeds and similar works by regional weed taxonomists, BIOTROP still considers it to be an important aspect in its overall mission, to produce more detailed information on the regional weed flora since there is still a lack of information in particular areas and in various ecosystems in comparison with the magnitude of the problem. Moreover, shifts in weed population as a consequence of developing weed control practices dictate the need to have up-to-date information of weed populations in important agricultural ecosystems in Southeast Asia, such as in ricefields, other food crops, plantation/industrial crops (rubber, tea, oil-palm, sugarcane, cotton, coconut) and in water systems (lakes, swamps, rivers, etc.).

In this connection the species identification sheet system will be continued, while a practical methodology in sampling technique and weed vegetation analyses will be developed.

#### *Autecological Studies of Important Weeds*

Various important weed species will be studied in their environments, considering their association with the entire system, to develop better understanding of their behaviour and the losses caused by them. The study should also cover possible associations of these weeds with other pests such as disease-causing agents, insects, nematodes, small vertebrates and their natural enemies. This is an attempt to find weak spots in their life cycle when the weed is most vulnerable to control measures.

#### *Weed Seed, Seedlings and Perennial Propagule Studies*

Studies on weed seeds and seedlings offer a valuable source of better understanding as well as new basic information, and could

significantly improve weed control technology. Weed seeds are a potential source of serious weed infestations; it is most essential to eliminate their germination or induce uniform germination. The early stage of weed seedling development usually causes the minimum interference with the crop, so it is wise to attack weeds at this point. Recognition of weed seedlings is therefore essential. Studies of the perennial propagules will have similar importance.

### *Crops and Weeds*

Studies on interrelations of specific crops and weeds or weed complexes of practical importance — *e.g.*, critical period of competition; effect of heavy seeding, fertilizers, etc.; allelopathy; effects of weeds in suppressing or increasing populations of pests, disease-causing agents, other worst weeds, etc.

### *Herbicide Activity*

Factors influencing the activity of herbicides on crops and weeds — *e.g.*, morphology, environment, soil, formulation, persistence.

### *Aquatic Weed Studies*

The construction of dams in Southeast Asia will create many man-made lakes in the near future. In various cases the management of man-made lakes has run into difficulties caused by aquatic weeds. In the present situation in Southeast Asia, where water serves as one of the most vital and complex resources for men, a combination of mechanical, cultural, chemical and biological control of aquatic weeds is imperative. Planned studies cover the correct assessment of the problems, biology of important weeds, their interference with proper water utilization, and the development of principles for effective water management.

## 3. FUTURE TRAINING

There will be three training courses on weed science during the first Five-year Development Plan. Since BIOTROP has only a small staff, training courses will be still dependent on outside expert assistance. It is hoped that a group of lecturers, especially those already involved in the first and second weed science training courses, will continue to form a nucleus of lecturers and

instructors for future courses. This will enhance improvements in the assessment of up-to-date problems in weed control and the consistent but refreshing transfer of knowledge.

It is obvious that in the future there should be more emphasis on an integrated systems approach system in the whole context of pest management.

It was originally planned that training courses would be conducted elsewhere in the region on a rotation basis, considering that there are other facilities existing in the region that might be available for eventual collaboration with BIOTROP in conducting weed science courses. However, practical matters such as availability of experts should be further considered in this regard. In the meantime, BIOTROP has planned during the first and second year to build a housing complex to accommodate its trainees, research scholars as well as experts, under personnel exchange programmes.

#### 4. SEMINARS AND WORKSHOPS

To stimulate scientific communication among workers on problems of mutual interest and exchange of ideas and expertise on how to solve these problems efficiently with optimum safety, BIOTROP is planning to hold seminars, workshops or conferences. A seminar is also useful in obtaining concurrent review of recent advances. Furthermore, an objective of a seminar is to stimulate a creative thinking and set up guidelines for the initiation of proper weed research, training and weed control programmes.

It is planned that BIOTROP will have an international workshop on aquatic weeds in 1974 and a seminar on current development in weed science in 1977. Considering the current trend of development of weed science in the region, it is envisaged that the seminar will serve as a timely basis for evolving a much broader spectrum of research, training and weed control strategies, and to provide additional and optional inputs into the decision-making institutions.

It should be respectfully pointed out that it will be a source of much pleasure and gratitude to BIOTROP, if a distinguished and highly authorized community such as the Asian-Pacific Weed Science Society might share in knowledge and experience with BIOTROP, possibly in a jointly sponsored weed science conference or seminar in the future.

## PRESIDENTIAL ADDRESS

L. J. MATTHEWS

"I would suppose that no subject in the whole field of agricultural technology has advanced more rapidly during the last two decades than that with which this conference is concerned." These words were first echoed by Sir James A. Scott Watson in his presidential address to the British Weed Control Conference in 1953. His statement was no doubt helpful in aiding the establishment of the first, and to my knowledge, the only official research station in the world devoted to weed science.

Compare this situation with official research in the allied disciplines of plant pathology and entomology. Man's inherent fear of diseases and insects has softened the attitude to research in these subjects. Cultivation of wild *Triticum* species gave rise to modern civilization; hence man tends to accept weeds. This is the soundest explanation I can offer for the slow and often imperceptible growth of official weed science in many developed countries.

Official research administrators remain defenceless, but unmoved by such findings as:

"Every agricultural practice develops its own set of weeds."

"The use of herbicides has increased more rapidly than for any other agricultural material including fertilizers."

"In agro-chemical companies weed specialists outnumber their counterparts in plant pathology and entomology."

"Research stations funded by Rockefeller Foundation and others — IRRI, CIAT, CIMMYT — have developed along the lines of one entomologist, one weed scientist, one plant pathologist, not 20 entomologists and no weed scientists."

"Emerging nations have equated the same pattern of one entomologist, one weed scientist."

"The largest herbicide users have the highest production per hectare."

"Herbicides have reduced the requirement for cultivation, and in certain directions may replace cultivation, signifying the first major advance in a thousand-year-old practice."

Official administrators, coerced by extremist pressure groups, are tending to hide behind more and more restrictive legislation. This has the negative effect of less money available for research, many promising pesticides are not processed, and those products that reach commercialization are excessively priced. I see no end to this spiral, and can only suggest that industry adapt the

equally irresponsible attitude of withdrawing all pesticides for a period sufficiently long to reduce seriously the food supply and shock the world into reality.

Weed science education follows a similar pattern. Nowhere in the developed nations of the world is weed science education accorded the same status as that of plant pathology and entomology. If weed science is taught it is not taught within its own rights but usually as an aside to some other major course such as agronomy. In your host country weed science has not yet reached that stage. Compare this with three universities teaching entomology as a discipline and five universities teaching plant pathology as a discipline, or the position in U.S.A., where in 1970 there was not a single weed science department at any university, while 32 State departments had a plant pathology department and 43 had an entomology department.

For these reasons the East-West Center, Hawaii, must be congratulated on their forward thinking in arranging a pesticide symposium with the objectives of defining a suitable course of study for B.S., M.S. and Ph.D. levels. The proposed courses fully equate the three disciplines of weed science, entomology and plant pathology. How acceptable such courses are likely to be is difficult to forecast, but universities must accept the challenge of producing graduates suitable for the changing demands of agriculture. The attitude of "this is what we teach and this is what you get" must change.

An integrated multi-discipline approach to pests has many advantages as numerous problems are inter-related. Weed scientists have much to offer the entomologist and the reverse is true. The simple finding that weeds cause the greatest crop depression from germination to the 1- to 2-leaf stage and thereafter affect yields very slightly offers a ready explanation for the entomologist's quandry of determining economic threshold levels for insect populations, the major percentage of which attack the crops at an advanced stage of development. Many other examples could be given, but it would be adequate to say the entomologist should not stand aloof from the weed scientist and vice versa.

The speaker was largely responsible in 1961 for widening the scope of the then New Zealand Weed Control Conference to include other pests. This has many advantages in that pest problems of a crop may be discussed from all aspects.

Perhaps the problem closer to your interests is that of the future role of our society and the formation of an international weed science society or council. At present four regional weed



science societies exist — the European Weed Science Council, the Weed Science Society of America, ALAM (which covers the Latin American countries) and our own Society. There are some 21 national weed control societies throughout the world. My proposal is that the national weed science societies affiliate with the regional weed science societies in their geographic area, and the four regional weed science societies co-host in rotating an international conference every eight years. Apart from the requirement of a small secretariat attached to responsible organizations such as the Weed Research Organisation, English liaison and communication world-wide could be achieved through the national weed science societies, with each society being responsible for informing its own members.

The fourth conference of the APWSS was largely organized in this way. Initially executive members were appointed Area Programme Conveners for set geographical areas. Owing to circumstances beyond their control many of the area programme conveners could not function as such. Furthermore, arrangements for circulating newsletters broke down and our fourth conference received the necessary publicity through affiliated societies and other agencies.

This brings me to the organization of our own society. I strongly recommend that future executive members be officers of affiliated national weed science societies which are capable of giving similar support to that of our New Zealand Weed and Pest Control Society to this conference. The responsibility then lies with an organization and not with an individual, who may or may not be able to undertake the necessary duties. It is also necessary to have a permanent secretary in a permanent location. He should be the key man in co-ordinating the society's activities and a known figure to which members are able to turn.

It has been my pleasure to serve you as President and the numerous sincere messages of congratulations have been very rewarding. I am particularly indebted to our affiliated weed science societies, International Plant Protection Center, Oregon, Weed Research Organisation, England, agro-chemical industry at home and abroad, to mention but a few, and to my own Department and New Zealand Government. I particularly thank the New Zealand Weed and Pest Control Society for co-hosting the 4th Conference.

Thanks each and every one of you for your support.

## REPORT ON 4TH ASIAN-PACIFIC WEED SCIENCE SOCIETY CONFERENCE

The 4th Conference was held at the Rotorua International Hotel, Rotorua, New Zealand, 12 to 16 March 1973, and co-hosted by the New Zealand Weed and Pest Control Society. A review type conference was held, with proceedings being preprinted and authors outlining the main points of their papers in five minutes or so. The value of most conferences lies in the meeting of fellow workers and having ample time for discussion of papers. Seventy-eight papers were presented in 16 review sessions, with most sessions generating lively discussion. A "New Zealand Evening", funded by the New Zealand Government, was a highlight of the conference. This, coupled with social hours funded by New Zealand industry did much to generate friendship among the fellow workers. Four post-conference tours were offered. Only one tour was taken and proved very successful. Messages of congratulations were received from the Weed Science Society of America and the New Zealand Government.

Delegates attended from New Zealand, Japan, Australia, U.S.A., Hong Kong, Taiwan, India, Indonesia, Malaysia, Singapore, New Caledonia, Lourenco Marques, Tanzania, Kenya, Switzerland, Germany, Netherlands and Solomon Islands. In all more than 300 delegates participated in the activity of the society.

### ORGANIZATION OF 4TH CONFERENCE

Initially executive committee members were appointed Area Programme Conveners for set geographical areas. Owing to circumstances beyond their control, a number of executive members could not fulfil their role. Weed Science Societies within the broad geographic area covered by the APWSS were invited to affiliate in order to improve liaison and communication between societies. With the exception of the Philippine Weed Science Society, all societies affiliated and the necessary publicity was received through them, and other organizations such as the International Plant Protection Center, Oregon, and Weed Research Organisation, England.

For the 5th Conference to be held in Japan in 1975 officers of affiliated societies were appointed to the executive as under:

- President:* K. Noda; S. Matsunaka — Weed Society of Japan and JAPR (Japan and Korea)
- Vice President:* M. Soerjani — Weed Science Society of Indonesia (Indonesia)
- Immediate Past President:* L. J. Matthews — New Zealand Weed and Pest Control Society (New Zealand)
- Secretary:* D. L. Plucknett — Permanent position (Hawaii)
- Treasurer:* R. Nishimoto — Permanent position (Hawaii)
- Executive Members:* P. W. Michael — The Weed Society of N.S.W., Australia (Australia)  
N. C. Joshi — Weed Science Society of Indonesia (India, Pakistan and Burma)  
A. Seth (Malaysia)  
M. H. Lambert (Pacific Islands)  
S. R. Obien — Weed Science Society of the Philippines (Philippines)  
E. G. Rodgers (or designee) — Weed Science Society of America (America)
- Area Programme Conveners:* P. J. Terry (Africa)  
N. van der Schans (South America)

#### RULES OF THE SOCIETY

A Constitution for the Society was drawn up by the President and approved at the biennial general meeting.

# RULES OF THE ASIAN-PACIFIC WEED SCIENCE SOCIETY (INC.)

## 1. NAME

The name of the Society shall be the Asian-Pacific Weed Science Society (Incorporated) hereinafter called the Society.

## 2. OBJECTIVES

The objectives of the Society shall be to promote weed science, in particular in the Asian and Pacific regions, by pooling and exchanging information on all aspects of weed science.

## 3. MEMBERSHIP

There shall be four classes of members:

- (i) Ordinary members.
- (ii) Sustaining members.
- (iii) Honorary members.
- (iv) Associate members.

## 4. MODE IN WHICH PERSONS BECOME MEMBERS

- (i) *Ordinary members*: Any person interested in the objectives of the Society may become a member.
- (ii) *Sustaining members*: Proprietary companies interested in the objectives of the Society may become sustaining members by biennial financial contributions to the Society.
- (iii) *Honorary members*: Any member who has given outstanding service to the Society may be elected as an honorary member at any biennial or special general meeting.
- (iv) *Associate members*.

## 5. MODE IN WHICH PERSONS CEASE TO BE MEMBERS

- (i) Any member of the Society may resign by giving notice in writing to the Secretary.
- (ii) Any member whose subscription is more than four years in arrears shall be removed from membership and may be readmitted on payment of such arrears or an amount decided by the Executive.

## 6. OFFICERS OF THE SOCIETY

The Officers of the Society shall be:

- (i) President
- (ii) Vice-President
- (iii) Secretary
- (iv) Honorary Treasurer

and shall be elected at the biennial general meeting. Officers shall hold office until three months after termination of the biennial general meeting next following their election. Newly appointed officers shall take office at the same time.

## 7. EXECUTIVE COMMITTEE:

The Executive Committee shall consist of:

- (i) The President
- (ii) Vice-President
- (iii) Secretary
- (iv) Honorary Treasurer
- (v) Immediate Past President
- (vi) Six other members

The Executive Committee shall have power to appoint new members to fill any casual vacancy and shall have power to co-opt not more than three other members.

## 8. ELECTION OF EXECUTIVE COMMITTEE

The members of the Executive Committee shall be elected at the biennial general meeting in the same manner and at the same time as other officers.

## 9. POWERS OF THE EXECUTIVE COMMITTEE

The Executive Committee shall have all the powers of the Society provided that these powers do not conflict with the rules.

## 10. DELEGATION OF POWERS BY EXECUTIVE COMMITTEE

The Executive Committee may delegate its powers and duties to subcommittees consisting of such member or members as it may resolve and may grant to any such subcommittee the power to co-opt other persons, whether members or not.

## 11. EXECUTIVE COMMITTEE — QUORUM

At any meeting of the Executive Committee four shall form a quorum.



## 12. PATRON OF THE SOCIETY

A patron shall be selected from the country in which the President is resident.

## 13. BIENNIAL GENERAL MEETING

- (i) A biennial general meeting shall be held every two years at the biennial conference or at a time or place decided by the Executive Committee.
- (ii) If not to be held at the biennial conference, at least three months' notice shall be given to all financial members of the time and place of biennial general meeting.
- (iii) At each biennial general meeting an audited balance sheet and income and expenditure account shall be presented.
- (iv) At each biennial general meeting a biennial report shall be presented.
- (v) At the biennial meeting (or any special general meeting) a quorum shall consist of 15 members.

## 14. VOTING

Only ordinary and honorary members are entitled to vote. At all meetings voting shall be on the voices or by a show of hands at the discretion of the Chairman provided that if any member shall so demand voting shall be by ballot. The Chairman shall have a deliberative and casting vote. Except where otherwise stated, a simple majority shall be sufficient to carry a motion.

## 15. SPECIAL GENERAL MEETING

A special general meeting may be held at any time by resolution of the Executive Committee or on receipt by the Secretary of a requisition signed by at least 20 members specifying the purpose for which the meeting is to be called. At least three months' notice shall be given to all financial members of the time and place of such meeting.

## 16. FUNDS

All funds of the Society shall be paid to the Honorary Treasurer, who shall keep correct accounts showing the details of the Society's financial affairs and shall disburse monies of the Society under the authority of the Executive Committee.

## 17. BANK ACCOUNTS

The Society's bank account shall be operated by the Secretary, Honorary Treasurer and any two other members of the Society or other persons appointed by the Executive Committee for that purpose. Cheques and withdrawal warrants shall be signed by any two of the signatories.

## 18. FINANCIAL YEAR

The financial year of the Society shall end on April 30 in each year, or such other date that may be decided from time to time by the Executive Committee.

## 19. AUDITOR

At each biennial general meeting an Honorary Auditor shall be elected.

## 20. SUBSCRIPTIONS

The biennial subscription which is due at the beginning of the financial year and which shall include all privileges including a copy of the *Proceedings* of that year, shall be \$4.00 or such other sum as may be decided from time to time at any biennial or special meeting. The fee for associate members would be half that for ordinary members. Non-members may be admitted to conferences on a daily fee which may be decided by the Executive Committee.

## 21. COMMON SEAL

The common seal shall be kept in the custody of the Secretary and shall be affixed to documents only by the direction of the Executive Committee, in the presence of the Secretary and any one member of the Executive Committee.

## 22. ALTERATIONS OF RULES

The rules of the Society may be altered, rescinded, or added to at any general meeting provided that two-thirds of the members present vote accordingly, and provided that at least three months' notice of intention is sent by post to members.

## 23. POWER TO BORROW FUNDS

The Society shall have power to borrow money.

#### 24. DISTRIBUTION OF ASSETS

In the event of the winding up of the Society the funds and the property of the Society shall be distributed to any other body or organization having the same or similar objectives as those of the Society or to such charitable organizations or such charitable purposes as shall be decided by members at the general meeting.

#### 25. OFFICIAL LANGUAGE

The official language of the Society shall be English.

#### 26. CURRENCY

The currency shall be U.S.A. dollars.

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## INDEX OF WEED SPECIES

The page numbers given below are the *first* references to species in any particular paper. They do not preclude subsequent reference to the species in the same paper. The paper "Weeds of New Zealand" by A. J. Healy (pp. 105-14) was not included in this index. Figures in bold type are the page numbers of papers concerned entirely or mainly with the particular species.

- |                                     |  |
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