

# CHEMICAL CONTROL OF PLANT DISEASES IN INDONESIA

Triharso \*)

## Ringkasan

Pemberantasan penyakit tumbuhan secara kimiawi belum banyak dilakukan oleh petani, karena dianggap tidak menguntungkan. Dalam makalah ini disajikan ringkasan hasil penelitian tentang penggunaan fungisida dalam pemberantasan penyakit tanaman oleh beberapa peneliti, terutama penelitian-penelitian yang dikerjakan selama dua tahun terakhir. Pemakaian fungisida tersebut meliputi tanaman-tanaman pangan maupun tanaman perkebunan.

## INTRODUCTION

Chemical control of plant diseases in Indonesia has not been done extensively by the farmers, because it is considered not beneficial yet. This fact is shown in supplying fungicides in the intensification program in 1974/1975, such as the supply of Dithane M-45 was only 108.8 tons, Daconil 75 WP, and Antracol 70 WP was only 50 tons (Siregar, 1976).

In this paper it will be reported only efforts to control plant diseases within the last two years by several investigators, concerning to control diseases of both food and plantation crops.

### I. Attempt to chemical control of food crop diseases

#### 1. Rice (*Oryza sativa* L.)

The control of rice diseases is usually applied to the seedborne pathogens, for example by treating in 1% sodium hypochlorite for 10 minutes, Panocrine/CG 450 at 20 ml/40 kg of seeds. This seed treatment was applied to the pathogens such as : *Drechslera oryzae*, *Fusarium sp.*, *Cladosporium sp.*, *Phomopsis* etc. The treatment may reduce infection from 25 - 35% to 5 - 8% (Sutakaria and Satan, 1976; Mardinus, 1976).

#### 2. Soy-bean (*Glycine max* (L) Merr.)

Soybean seed treatment with 2 g Ceresan/kg of seeds or with 1% Sodium Hypochlorite for 10 minutes may reduce infection of *Colletotrichum truncatum* (Schw.) to 5% (Sinaga et al., 1976).

#### 3. Groundnut (*Arachis hypogaea* L.)

Attempts to control groundnut diseases were applied to leaf diseases caused by : *Cercospora arachidicola*, *C. personata*, and *Puccinia arachidis*, with Daconil 75 WP, at the concentration of 1.5 g/l and the dosage of 400 l/ha. The application was carried out at 20 to 80 -day-old plants with 2 week interval. Diazinon spraying at the concentration of 0.2% formulation and the dosage of 400 l/ha was done to reduce vectors of virus and mycoplasma (Triharso, 1976).

#### 4. Mungbean (*Vigna radiatus*)

Attempts to control mungbean scab caused by *Elsinoe iwatae* Kajiwara et Mukelar was done by using Bavistine 50% WP, Topsin M 70% WP and Benlate 50% WP. Four time spraying may reduce infection from  $\pm 22\%$  to  $\pm 2\%$  (Mukelar and Soemantri, 1976).

\*) Faculty of Agriculture, Gadjah Mada University, Yogyakarta, Indonesia.



4. Corn (*Zea mays* L.)

Trials to control downy mildew on corn caused by *Sclerospora maydis* were done by treating seeds with 0.3% Benlate, that reduce infection to 1 – 3% (Soeparyono, 1976).

Attempts to control in the field were done by using 2 g Pansoil/m<sup>2</sup> of soil, applied as solution, and was done as early as possible after sowing the seeds. This efforts may reduce infection of 70% (Kobayasi and Soedjadi, 1976).

Leaf spraying has ever been done with 0.1% Demosan, 0.2% Dithane M-45 and 0.8% Copper oxychloride, and were applied to 5-day-old plants. This treatment may reduce infection of 10 – 30% depended on the varieties of corn (Triharso *et al.*, 1976).

6. Potato (*Solanum tuberosum* L.)

Attempts to control leaf diseases caused by *Phytophthora infestans*, has ever been done with 0.15% at 400 – 800 l/ha, and may reduce infection of about 80%. Other fungicides such as Dithane M-45, Menzate, and Antracol, may reduce infection of 55 – 70% (Soediarso, *et al.*, 1976).

## II. Attempts to chemical control of plantation crop diseases

1. Tobacco (*Nicotiana tabacum* L.)

Attempts to control tobacco diseases with chemicals were aspecially applied to leaf spot caused by *Cercospora nicotianae* and nematodes.

To control *Cercospora* in the nurseries, soil treatment was done by fungicides spraying 3 days before the seeds were sown. Good results were obtained by using 0.2% Benlate, 0.6% Polyram Combi, 0.8% Dhitane M-45, 1.6% Defolatan 4F and 0.8% Antracol. These fungicides may reduce infection to 1% only.

Leaf spraying in the field by using 0.4% Liromatin, Dithane M-45 and Antracol reduce infection to 21%.

Soil treatments to reduce nematode population were done by using nematicides : Temic 10G at 38.5 kg/ha, Basamid G at 600 kg/ha, DD shell at 450 kg/ha, and Vydate G at 117.5 kg/ha (Hartana, 1975; Djojokusumo, 1976; Rahmadiono and Kartono, 1976).

2. Sugar cane (*Saccharum officinarum* L.)

Soil fumigants that were applied to reduce nematode populations using DD at 180 l/ha, DD at 280 l/ha and Nemagon at 30 l/ha may also increased the sugar cane weight to 21.2 – 23.8%, 16.5 – 32.9% and 16.5 – 29.6%, respectively, and increased the cristalls to 18.9 – 26.6%, 21.1 – 33.2%, and 19.7 – 30.4%, respectively (Handoyo *et al.*, 1976).

3. Rubber (*Hevea brasiliensis* (Wild ex A. Juss.) M.A.)

Mouldy rot, caused by *Ceratostomella fimbriata* was reported can be controlled by using cycloheximide (0.5% Actidione), Captafol (5% Difolatan 4-F), and Pancil. The control capability of these fungicides may reach more than 65% (Basuki and Usman Nasution, 1976). 0.2% Bavistine 50 WP was also very effective (Soekirman, 1976).

*Oidium heveae* may be controlled by using Cirrus sulfur at 5 kg/ha, while to control *Colletotrichum gloesporioides*, the addition of Dithane M-45 at 2 kg/ha was needed (Supadmo, 1976). To control *Colletotrichum* in the nurseries, the effective fungicides were : 0.15% Dithane M-45, Daconil, Benlate, Defolatan, and others (Parnata, 1976).

The infection of white root fungus (*Rigidoporus lignosus* Klotzsch et Imazeki) may be reduced by sulfur spreading around the tree as much as 100 g/tree at the time of planting (Basuki and Nasution, 1976).



4. Cinchona (*Cinchona ledgeriana* and *C. succirubra*)

Laboratory test to control die back in the cinchona nurseries caused by *Phytophthora citricola* Saw. has been done by using 1.0% Calizin, 0.5% Perenox, and 0.5% Cobox (Saleh et al., 1976).

5. Tea (*Camellia sinensis* (L.) O.K.)

The control of Blister Blight (*Exobasidium vexans*) has been done by using fungicides such as : Sicarol at 450 g/500 l/ha, Perenox at 300 g/500 l/ha, Copper oxychloride at 300 g/500 l/ha, and Copper count N at 300 g/500 l/ha (Martosoepono and Suhargianto, 1976).

Soil treatment by using Dithane M-45 at 150/g/m<sup>2</sup>, resulted in positive effect on the cuttings root system. Nematode populations were not reduced by dithiocarbamate (Koch, 1976).

6. Cacao (*Theobroma cacao* L.)

By spraying fungicides such as Menzate D. Cuprous oxide, and Copper oxychloride at 0.5 l/tree with 2 week intervals 12 times) may reduce cocoa pot rot caused by *Phytophthora palmivora* of 30 - 40% and increase the productive fruits of 30 - 40% also (Somomarto, 1975).

7. Coffee (*Coffea* spp.)

The reduction of uredospore germination of *Hemileia vastatrix* has been tried by spraying with Benomyl 50% WP at the dosage of 1 l/tree and the concentration of 500 - 1000 ppm (Christanti, 1976).

8. Tempuyung (*Sonchus arvensis* L.)

Spraying by using Polyram M 80% WP at the concentration of 0.3% and the dosage of 1200 g/ha with 10-day interval was done to reduce rust destruction caused by *Puccinia sonchi arvensis* (Sabardinah et al., 1976).

### III. The prospect of using fungicides in the future

It is apparent that in the intensification program of second crops, vegetables and plantation crop will be used more fungicides. However, this matter depends on the improvement of market costs of the commodities. In the near future controlling the disease by cultural practices, using resistant varieties and strong quarantine measurement are advisable.

Very few investigations have been done concerning the aspects of fungicidal residue left on the plants, in the soil and water, and the affects of the residue on human being and cattle.

### REFERENCES

1. Basuki dan Usman Nasution (1976) Kemunduran fungisida Benomyl terhadap Mouldy rot pada tanaman karet dan penggantinya. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20 - 21 Desember, 1976. 12 p.
2. Basuki dan Usman Nasution (1976) Penggunaan belerang terhadap penyakit akar putih (*Rigidiporus lignosus*) pada tanaman karet. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung 20 - 21 Desember 1976. 9 p.



3. Christanti (1976) Usaha pemberantasan penyakit karat pada kopi. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20 – 21 Desember 1976. 9 p.
4. Handoyo, H.; Siswoyo dan L. Legowo (1976) Percobaan nematicide di tanaman tebu tahun-tahun 1973–1976. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20 – 21 Desember 1976. 14 p.
5. Hartana, I. (1976) Hasil-hasil sementara mengenai efektifitas beberapa fungisida terhadap penyakit patik (*Cercospora nicotianae*) pada tembakau. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia Cibogo, Bogor 22 – 25 Februari 1975. 8 p.
6. Djojokusumo, Sismadi (1976) Masalah penyakit pada tembakau rakyat dan pemberantasannya. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia. BPTK Gambung, Bandung 20 – 21 Desember 1976. 15 p.
7. Kobayasi, T. dan M. Sudjadi (1976) Field Test of a fungicide echlomezoll (pansoil) for controlling Corn Downy Mildew. *Sclerospora maydis*. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 7 p.
8. Koch, V.J.M. (1976) Dithane M-45, its influence on rotting of tea cuttings. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 9 p.
9. Mardinus (1976) Cendawan *Drechslera oryzae* pada benih padi dan perlakuan dengan Penoctine/CG 450. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 7 p.
10. Martosoepono, Martanto dan Suhargiyanto (1976) Pengujian beberapa fungisida cacar teh. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 9 p.
11. Mukelar dan Otjim Sumantri (1976) Pemberantasan Penyakit kudis ("scab") pada kacang hijau (*Elsinoe iwatae* Kajiwara et Mukelar). Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 8 p.
12. Parnata, J. (1976) Masalah Pemberantasan penyakit daun Gloeosporium di perkebunan karet Sumatra Utara. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 8 p.
13. Rahmadiono, Sunarti dan Gatot Kartono (1976) Pengujian fungisida untuk menekan jumlah patik pada daun tembakau. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 14 p.
14. Sabardinah, Siti Ambarini; A. Hidir Sastraatmadja; Sugiharso; Soengeng Sudiato (1976) Pengujian beberapa fungisida dan pengaruh pemupukan Kalium terhadap penyakit karat (*Puccinia sonchi arvensis* Tohunaga et Kawai) pada tanaman tempuyung (*Sonchus arvensis* L.). Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 13 p.
15. Saleh, Nasir; Haryono Semangun dan Martanto Martosupono (1976) Penyakit mati ujung pada semai kina. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 5 p.
16. Sinaga, Meity; Jusuf Sutakaria; Rusmilah S. dan Syarkani Musa (1976) Infeksi cendawan *Colletotrichum truncatum* (Schw.) pada berbagai umur tanaman kedelai (*Glycine max.* (L) Merr.) dan pengaruhnya kepada benih yang dihasilkan. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20–21 Desember 1976. 9 p.



17. Siregar, Salim (1976) Pengadaan dan pemasaran pestisida di Indonesia. Simposium peranan pestisida dalam pengelolaan Hama penyakit tanaman dan tumbuhan pengganggu. Jakarta, 5-7 Juli 1976. 10 p.
18. Soediarto, Ahmad; A. Hidir Sastraatmadja dan Jusuf Sutakaris (1976) Pengujian efektifitas beberapa fungisida dan variasi selang waktu penyemprotan terhadap penyakit daun *Phytophthora infestans* (Mont.) de Bary pada tanaman kentang (*Solanum tuberosum* L.). Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20-21 Desember 1976. 19 p.
19. Soeparyono (1976) Seed health studies on maize. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20-21 Desember 1976. 6 p.
20. Somomarto, Suharsono (1975) Pengujian lapangan berbagai macam fungisida terhadap penyakit busuk buah (*Phytophthora palmivora*) pada tanaman coklat. Kongres Nasional III Perhimpunan Fitopatologi Indonesia, Cibogo, Bogor 22-26 Pebruari 1975. 11 p.
21. Sukmaraganda, Tatang; Jusuf Sutakaria; Sjamsoe'oad Sadjad dan Soegiharso (1976) Pengaruh penyimpanan terhadap perkembangan cendawan pada benih kedelai var. Americana. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20-21 Desember 1976. 8 p.
22. Sukirman, P. (1976) Pengujian efektifitas beberapa fungisida terhadap Mouldy rot. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung, 20-21 Desember 1976. 14 p.
23. Supadmo, B. (1976) *Colletotrichum gloeosporioides* sebagai penyebab penyakit gugur daun pada karet. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung 20-21 Desember 1976. 7 p.
24. Sutakaria, Jusuf dan Uha Suharja Satan (1976) Cendawan yang terbawa benih padi dan berbagai penyakit padi yang terdapat di delta Upang Sumatra Selatan. Kongres Nasional IV Perhimpunan Fitopatologi Indonesia, BPTK Gambung, Bandung 20-21 Desember 1976. 6 p.
25. Triharso (1976) An approach to the integrated control of groundnut diseases. Laboratory of Plant pathology, Faculty of Agric. Gadjah Mada University Yogyakarta Indonesia. 13 p. (Report).
26. Triharso; Tukidjo Martoredjo dan Lilik Kusdiarti (1976) Recent problems and studies on downy mildew of maize in Indonesia. Laboratory of Plant Pathology, Faculty of Agric. Gadjah Mada University. Yogyakarta, Indonesia 10 p. (in press).