

Dampak Pengendalian Hama Terpadu pada Lingkungan Produksi Sayuran (Studi Kasus Lingkungan Produksi Kentang dan Kubis di Kabupaten Banjarnegara Jawa Tengah)

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Abstrak

ABSTRAK

Agroekosistem adalah suatu lingkungan binaan dan menjadi bagian dari ekosistem alam yang didominasi oleh manusia dan tanaman pertanian. Keanekaragaman hayati yang rendah dan ekosistemnya yang tidak stabil, menyebabkan terjadi eksplosif hama atau organisme pengganggu tanaman (OPT). Kondisi tersebut menjadi kendala utama bagi lingkungan produksi sayuran di Kabupaten Dati II Banjarnegara Jawa Tengah.

Pada sistem konvensional, penggunaan pestisida yang intensif dianggap sebagai cara pengendalian OPT yang efektif. Namun demikian, cara tersebut memiliki dampak negatif seperti: tercernanya tanah dan air, ancaman bagi kesehatan manusia, dan tidak efisiennya usaha tani. Untuk menanggulangi permasalahan tersebut, di Indonesia telah diterapkan sistem pengendalian hama terpadu (PHT) untuk tanaman padi pada tahun 1989 dan untuk tanaman sayuran pada tahun 1992.

Sistem PHT adalah suatu konsep atau filosofi untuk menanggulangi masalah hama melalui pendekatan ekologi dan ekonomi. Ada tiga konsepsi dasar PHT yaitu: pengamatan agroekosistem, konsepsi ambang ekonomi (AE), dan konsepsi pelestarian lingkungan. Dalam program PHT, petani dilatih memahami konsepsi dasar itu melalui sekolah lapangan pengendalian hama terpadu (SLPHT) yang berlokasi di lahan milik petani, dengan proses belajar berdasarkan pengalaman, agar petani dapat menerapkan teknologi PHT di lahannya sendiri.

Tujuan dari studi ini ialah untuk mengetahui dampak implementasi sistem PHT dibandingkan dengan sistem konvensional pada komponen lingkungan yang meliputi: pendapatan usaha tani kentang dan kubis, keanekaragaman spesies serangga di pertanaman kentang/kubis, serta kadar residu pestisida di dalam hasil panen, tanah dan air larian yang berasal dari pertanaman kentang/kubis yang menerapkan sistem PHT dan sistem konvensional.

Metode penelitian yang digunakan adalah Ex Post Facto atau kausal komparatif dengan metode penetapan sampel Purposive Sampling dan Simple Random Sampling. Penelitian dilaksanakan di dataran tinggi Dieng Kabupaten Dati II Banjarnegara mulai bulan November 1998 sampai dengan Januari 1999. Wilayah penelitian meliputi kecamatan Batur, Pejawaran dan Wanayasa. Dipilih dua sampel desa dari tiap kecamatan, yang terdiri atas satu desa yang mewakili sistem PHT dan satu desa mewakili sistem konvensional (non PHT). Sebagai responden ditentukan 20 petani kentang dan 20 petani kubis dari setiap desa. Jumlah responden di enam desa sampel tersebut ialah 240 petani, yang terdiri atas 120 petani PHT dan 120 petani non PHT. Untuk mengamati residu pestisida dan keanekaragaman serangga, ditentukan empat petak pertanaman kentang dan empat petak pertanaman kubis di setiap desa.

Pengaruh implementasi PHT pada nisbah manfaat dan biaya (BIC Ratio) usahatani kentang dan kubis berbeda sangat nyata dibandingkan dengan sistem konvensional. Demikian pula keanekaragaman spesies serangga bukan sasaran pada pertanaman sistem PHT berbeda sangat nyata. Secara umum pengaruh sistem PHT pada kandungan residu pestisida (insektisida) di dalam hasil panen dan tanah berbeda nyata sampai sangat nyata dengan sistem konvensional, sedangkan residu di dalam air larian pada umumnya tidak berbeda nyata.

Berdasarkan batas maksimum residu (BMR) menurut SKB MENKES dan MENTAN No, 8811MENKESISKBIVIII11 996-7 1 11Kpts/ TP.27018196, kadar residu dalam hasil panen di wilayah studi masih rendah, Rata-rata kadar residu yang terdeteksi di dalam umbi kentang ialah 0,0026 ppm dan di dalam krop kubis 0,0024 ppm, sedangkan BMR untuk kartaphidroklorida untuk umbi kentang adalah 0,1000 ppm dan untuk krop kubis adalah 0,2000 ppm. Hasil peneitian dapat disimpulkan sebagai berikut: (1) Pendapatan usaha tani kentang/kubis pada sistem PHT lebih tinggi daripada sistem konvensional. Nisbah manfaat dan biaya pada kentang sistem PHT ialah 1,04 dan sistem konvensional 0,85, sedangkan pada kubis sistem PHT ialah 1,18 dan sistem konvensional sebesar 0,82; (2) Keanekaragaman spesies serangga bukan sasaran di pertanaman kubis dan kentang yang menerapkan sistem PHT lebih tinggi daripada sistem konvensional, Rata-rata nilai keanekaragaman pertanaman sistem PHT adalah 2,01 dan sistem konvensional 1,10; dan (3) Kadar residu senyawa insektisida di dalam hasil panen (kentang dan kubis), di dalam tanah dan dalam air larian yang berasal dari pertanaman yang menerapkan sistem PHT lebih rendah daripada sistem konvensional, dengan perincian sebagai berikut: (a) residu insektisida pada basil panen pada sistem PHT adalah 0,0042 ppm, sedangkan pada sistem konvensional 0,0113 ppm, (b) Residu insektisida dalam tanah pada pertanaman sistem PHT ialah 0,0496 ppm dan pada sistem konvensional sebesar 0,06'70 ppm, dan (c) residu insektisida pada air larian di pertanaman sistem PHT adalah 0,0027 ppm dan pada sistem konvensional adalah 0,0054 ppm.

ABSTRACT

Impact of Integrated Pest Management on the Environment of Vegetable Crop (A Case Study on the Environment of Potato and Cabbage Planting in the Distric of Banjarnegara, Central Java Province) Agroecosystem is an artificial environment and as a part of the natural ecosystem in where dominated by human and crops. Due to low biological diversity and unstable ecosystem, pest outbreak always occur in a certain agroecosystem. This condition becomes major constraint for the environment of vegetable planting in the distric of Banjarnegara, Central Java Province.

In the conventional system, the use of pesticide intensively is considered as the most effective control measure to overcome pest problem. However, this In the conventional system, the use of pesticide intensively is considered as the most effective control measure to overcome pest problem. However, this system has negative impacts such as soil and water pollution, threat to human health, and inefficient farming system. To overcome this problem, integrated pest management (IPM) has been adopted and implemented in Indonesia since 1989 in rice and in vegetable crops since 1992.

IPM system is a concept or philosophy to overcome pest problem through ecological and economical approach. There are three basic concepts of IPM namely observation of the agroecosystem, establishment of

economic threshold and environmental conservation. In IPM program, farmers were trained to understand these basic concepts through Farmer's Field School (FFS) located at farmer's field, using experience learning processes, in order they can implement IPM technology at their own fields.

This objective of this study was to investigate the impact of the IPM implementation versus the Conventional system on the environment components, includes the income gained by farmers from the potato and cabbage farming, diversity of non-target insect species in potato and cabbage field, and the level of pesticide residues in yield, soil and run off originated from the fields which were subjected to IPM system versus Conventional system.

Wanayasa, located at Dieng plateau area district of Banjarnegara, Central Java-Two sample villages were chosen from each sub-districts. One village represented IPM system while the other one represented conventional system (non IPM). Respondents in each village comprised 20 potato farmers and 20 cabbage farmers; the total number of respondents involved in this study were 240 farmers (120 farmers for IPM system and 120 farmers for non IPM system). To observe the pesticide residues and the diversity of insects, four blocks of potato field and four blocks of cabbage field were chosen in each sample village.

It was found that the impact of IPM implementation on the net profit of potato and cabbage farming was significantly higher than that of conventional system. It was also found that the diversity of non-target species in the potato and cabbage field for IPM system was significantly higher than that of conventional system. In general, the effect of IPM system on the level of pesticide (insecticide) residues in the potato tubers and cabbage crops and in the soil was significantly lower than that of conventional system while the level of insecticide residues in run off was generally not significantly different in both systems.

Compared with the maximum residue limit (MRL) defined by joint decree of Ministry of Health and Ministry of Agriculture No. 881/IMENKES/SKB/IV/III/1996-71 liKpts/TP.27018/96, the levels of pesticide residue in the study area was relatively low because the average residue levels detected in potato tubers was 0.0026 ppm and in cabbage crops was 0.0024 ppm. According to this decree, the maximum levels for cartaphydrochloride residue in potato tuber is 0.1000 ppm and in cabbage crop is 0.2000 ppm.

In conclusion, results of this study are: (1) the net profit obtained by the farmer from potato/cabbage farming with IPM system was higher versus conventional system. The BIC ratios for potato with IPM system and conventional system were 1.04 and 0.85 respectively while for cabbage with IPM system and conventional system were 1.18 and 0.82 respectively; (2) the diversity of non target insect species in cabbage and potato fields with IPM system was higher than that of conventional system. The average of diversity of crop field with IPM system was 2.01 while in conventional system was 1.10; and (3) in IPM system, the insecticide residue levels in the potato tubers and cabbage crops, in the soil and in the water run off were lower than that of conventional system; as follows: (a) the insecticide residues in the potato tubers and cabbage crops practicing IPM system was 0.0042 ppm while from conventional system was 0.0113 ppm, (b) the insecticide residues in the soil samples from the crop field with IPM system was 0.496 ppm while in conventional system was 0.0670 ppm, and (c) the insecticide residue in water run off in the field with IPM system was 0.0027 ppm and in conventional system was 0.0054 ppm.