HABITAT AND DIFFERENT CROP VARIETIES DETERMINING WEED SPECIES COMPOSITION AND DIVERSITIES (STUDY CASES IN PALEMBANG AND INDRALAYA, INDONESIA)

Vu Khanh Linh[1*], Duong Van Thao[1], Le Van Viet[1], Arinafril[2]
[1]*University of Agriculture and Forestry - TNU*
[2]*Sriwijaya University, Indonesia*

SUMMARY

In this article, it evaluates the diversity of growing weeds in different cultivated crops areas in Palembang and Indralaya, Indonesia. Controlling of diverse ecological conditions of weed lives in seriously hard. Weeds brought damages to arable crops such as decreased productivity and quality of crops which have a strong development root systems and mostly distributed on the topsoil, thus, it easily competing with crops to the nutrients, light and water. The results of this research were collected 63 weed species belong to 55 generas and 32 families were identified. This study focuses on analysis to one number of key factors such as the density and number of species, habitats, fertilizers, chemicals and climate conditions of weeds. With this, different crops have affected the diversity of weeds in the research areas. Currently, some studies have illustrated that the change in weeds growth and development situations is closely related to habitat with crop species. Specifically, the several important essential elements like climate conditions, fertilizers, chemicals.

Key words: *Arable crops, diversity, habitat, fertilizers, weeds*

INTRODUCTION

Indonesia has opulently endowed with lush natural resource where situated in a favorable geographical position. However, in the recent years, climate factors affected very widely the agriculture, forestry, public health, biodiversity and natural resources. Climate in Indonesia has not only implications for the country's environment; it also immensely affects its people and development [2]. Over the last two decades, the economy of Indonesia has been growing at a fast pace due to good economic policy and political stability. Agriculture is one of the key sectors of Indonesian economy. The density of weed competition depend on: type of weed species, severity of weed infestation, duration of weed infestation, competing ability of crop plants and special, climatic conditions which affect weed and crop growth [1]. In addition, weeds in the tropics have limited in crop yields and have imposed a heavy burden on the human. Under the optimum growing conditions of high temperatures and ample moisture, the weeds grow rapidly and profusely, produced several generations per year and have a high population per unit area. Established field weed is difficult to control. The best way to control weeds is obtaining the combination of cultivation, selective herbicides, and competitive arable crops [5].

MATERIALS AND METHODS

Research object

The object in this study is to measure the diversity of weeds in different habitats and crops in Palembang and Indralaya, Indonesia. Besides, this study will determines the effect of several factors, such as climate factors (temperature and precipitation), use of chemicals (fertilizer, herbicides, and pesticides) on weed diversity.

Methodology

Methods of investigation and Sampling methods

Sampling methods

On each survey field, five sampling plots were selected and divided plots diagonally (one sampling plot in the middle and four plots on the corners, with a 1m x 1m dimension). First step, on each survey field,

[*] *Tel: 01642 532867, Email: Vukhanhlinh115@gmail.com*

five sampling plots were selected and divided the plots diagonally. Secondly, observing the weed species that is planted in subplot, then count the individual of each species. Next step, take pictures the weed species, for documentation. Then, identify the weed species to determine the correct name and place it in the system of classification in able to know more about the individual species of weeds in an arable crop system.

Processing and presenting samples

Samples were collected from the field that made in specimen. For processing, samples from the field in pre-treatment are wet, so samples will bring to laboratory for drying and flat pressing.

Identify and examine the scientific name

Simultaneously with the processing of the sample into the specimen satisfactory, carry out classify each family name that in the each families classifies into each limbs. When identifying the scientific name, we were conducted samples analysis based on the characteristics of branches, trunks, leaf shapes, roots, flowers and fruits. The main documents used in the process identification name scientific including: Viet Nam vegetation (Pham Hoang Ho, 1991 – 1993) [3]; Weeds of rice in Indonesia (Soerjani *et al.*,1987) [4].

Transect determination

Determining of transection is based on the types of vegetations and different types of lands (purposive sampling) to represent the types of lands and weeds in farm areas in Indralaya and Palembang.

Table 1. *Co-ordinate point of transects*

Transect	Co-ordinate point		Location
1	3°13'9.00"S	104°38'50"E	Indralaya 1
2	3°13'22"S	104°38'38"E	Indralaya 2
3	2°48'40"S	104°48'38"E	Talang keranat
4	3°13'9.00"S	104°42'52"E	Kebun Bunga
5	3°13'9.00"S	104°43'47"E	Graduate school in Sriwijaya University

Data analysis

The data used in cluster analysis and Processing performed on the computer by SPSS software.

RESULT AND DISCUSSION

Herbarium preparation and the relationship between places

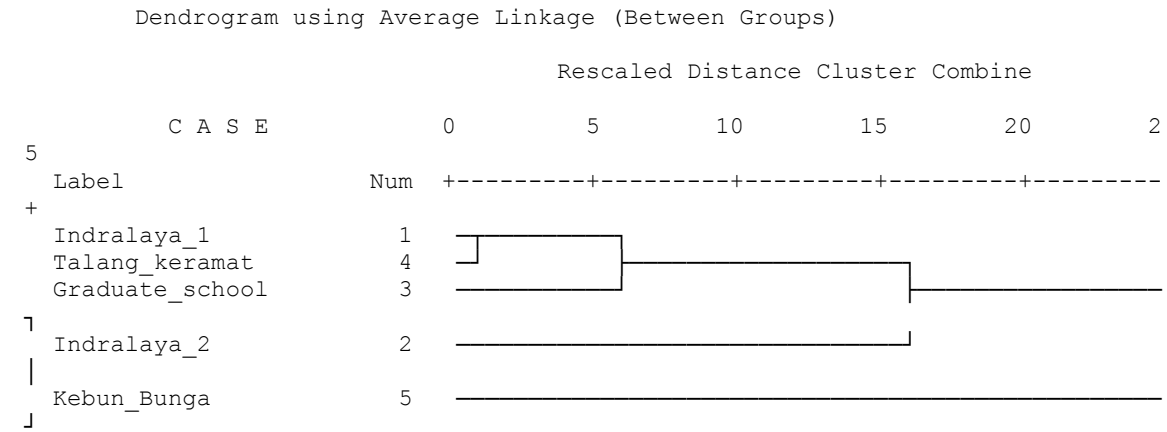

Figure 1. *A single-linkage cluster dendrogram showing the similarity place found at five light-trap sites in 5 reseach places*

From the given matrix, we found the most similar pair of samples. In this case, the greatest similarity is between 1 (Indralaya 1) and 4 (Talang-Keramat), equal to 1 (Distance cluster combine). The second most similar pair of samples, which turns to be place 3 (Graduate school)

and 1 (Indralaya 1), equal to 7 (Distance cluster combine), so these sites are linked together. The next-highest similarity is between places 3 (Graduate school) and 4 (Talang-Keramat), at 7. Therefore, place 3 is linked with the cluster of place 1 and 4, to form a three community. After that, we found the fourth most similar pair of samples between place 3 and 2 (Indralaya 2) at 17 (Distance cluster combine). Besides, place 2 is linked with the cluster of place 3, 4 and 1, so there are a four community. Finally, the last joining occurs between the place 1,2,3,4 and 5 cluster, at similarity at 25 (Distance cluster combine).

Weed survey

After completing the weed collection from the crop fields the specimens were identified by comparing with the specimens in main documents, which was certified under standardized reference. Later these identifications were checked again with help of floras and the correct name was provided to each plant.

Table 2. *Weed families of Indralaya and Palembang, Indonesia*

Scientific names	Species	Generas	Families
Paspalum virgatum	*P.virgatum*	Paspalum	Poeceae
Mimosa pudica	*M.pudica*	Mimosa	Fabaceae
Richardia brasiliensies	*R.brasiliensis*	Richardia	Rubiaceae
Ageratum conyzoides	*A.conyzoides*	Ageratum	Asteraceae
Achillea millefolium	*A. Millefolium*	Achillea	Asteraceae
Imperata cylindrica	*I.cylindrica*	Imperata	Poaceae
Melastoma affine	*M.affine*	Melastoma	Melastomataceae
Borreria alata	*S.alata*	Spermacoce	Rubiaceae
Torenia violacea	*Violacea*	Torenia	Linderniaceae
Dichrocephala integrifolia	*D.integrifolia*	Dichrocephala	Asteraceae
Panicum repens	*P.repens*	Panicum	Poaceae
Borerria laevis	*S.laevis*	Spermacoce	Rubiaceae
Ipomoea triloba	*I.triloba*	Ipomoea	Convolvulaceae
Brachiaria reptans	*B. reptans*	Brachiaria	Poaceae
Eleusine indica	*E. indica*	Eleusine	Poaceae
Uraria lagopodioides	*U.lagopodoides*	Uraria	Fabaceae
Hyptis capitata	*H.capitata*	Hyptis	Lamiaceae
Cyperus iria	*C.iria*	Cyperus	Cyperaceae
Spigelia anthelmia	*S.anthelmia*	Spigelia	Loganiaceae
Amaranthus gracilis	*A.hybridus*	Amaranthus	Amaranthus
Portulaca oleracea	*P.oleracea*	Portulaca	Portulacaceae
Limnophila erecta Benth	*L.erecta*	Limnophila	Plantaginaceae
Stenotaphrum secundatum	*S.cecundatum*	Stenotaphrum	Poaceae
Cyperus imbricatus	*C.imbricatus*	Cyperus	Cyperaceae
Phyllanthus debilis	*P.debilis*	Phylanthus	Phyllanthaceae
Cyperus kyllingia	*C.rotundus*	Cyperus	Cyperaceae
Phyllanthus niruri	*P.niruri*	Phylanthus	Phyllanthaceae
Cyperus distans	*C.distans*	Cyperus	Cyperaceae
Centrosema molle	*C.molle*	Centrosema	Fabaceae
Achyranthes aspera	*A.aspera*	Achyranthes	Amaranthaceae
Stachytarpheta jamaicensis	*S.jamaicensis*	Stachytarpheta	Verbenaceae
Cleome rutidosperma	*C.rutidosperma*	Cleome	Cleomaceae
Elatine triandra	*E.triandra*	Elatine	Elatinaceae
Phyllanthus urinaria	*P.urinaria*	Phylanthus	Phyllanthaceae
Scoparia dulcis	*S.dulcis*	Scoparia	Plantaginaceae
Blumea lacera	*B.lacera*	Blumea	Asteraceae
Mitracarpus villosus	*M.polycladus*	Mitracarpus	Rubiaceae
Delonix regia	*D.regia*	Delonix	Fabaceae

Physalis angulata	*P.angulata*	Physalis	Solanaceae
Eclipta prostrata	*E.prostrata*	Eclipta	Asteraceae
Boerhavia erecta	*B.erecta*	Boerhavia	Nyctaginaceae
Manihot Esculenta	*M.esculenta*	Manihot	Euphorbiaceae
Peperomia pellucida	*P.pellucida*	Peperomia	Piperaceae
Hypericum japonicum	*Hypericum*	Hypericoideae	Hypericaceae
Solanum melongena	*S.melongena*	Solanum	Solanaceae
Croton lobatus	*C.Lobatus*	Croton	Euphorbiaceae
Hedyotis corymbosa	*O.corymbosa*	Oldenlandia	Rubiaceae
Fimbristylis alboviridi	*F.alboviridis*	Fimbristylis	Cyperaceae
Bacopa rotundifolia	*B.rotundifolia*	Bacopa	Plantaginaceae
Echinochloa colona	*E.colona*	Echinochloa	Poeceae
Lindernia hyssopioides	*L.Hyssopioides*	Lindernia	Linderniaceae
Ipomoea aquatica	*I.aquatica*	Ipomoea	Convolvulaceae
Sauropus androgynus	*S. Androgynus*	Sauropus	Phyllanthaceae
Cleome viscosa	*C. Viscosa*	Cleome	Cleomaceae
Hydrolea spinosa	*H.Spinosa*	Hydrolea	Hydroleaceae
Eragrostis tenella	*E. amabilis*	Eragrostis	Poeceae
Ludwigia hyssopifolia	*L.hyssopifolia*	Ludwigia	Onagraceae
Setaria palmifolia	*S.palmifolia*	Setaria	Poaceae
Eriochloa polystachya	*E.polystachya*	Eriochloa	Poaceae
Ischaemum rugosum	*I. rugosum*	Ischaemum	Poeceae
Digitaria ciliaris	*D.ciliaris*	Digitaria	Poeceae
Brassica juncea	*B.juncea*	Brassica	Brassicaceae
Digitaria setigera	*D.setigera*	Digitaria	Poeceae

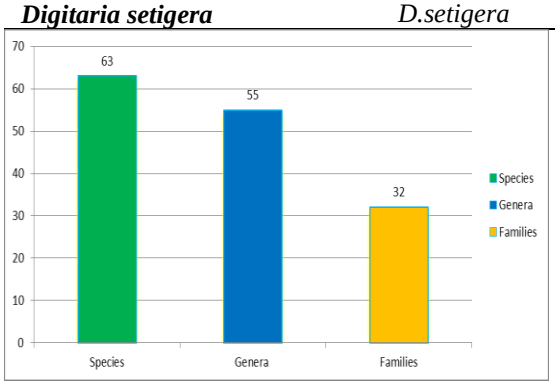

Figure 2. *Taxa of Weed Plants*

In this study, a total of 63 plant species, with 55 generas and 32 families were identified as crop land weeds in Palembang and Indralaya of Indonesia (Figure 2). These species are recorded exclusively from the cultivated crop fields only. The investigation also included plants found in field edges. The predominant weeds of this category are *Borreria alata* (Rubiaceae), *Eleusine indica* (Poaceae), *Portulaca oleracea* (Portulacaceae) and *Cyperus kyllingia* (Cyperaceae).

The influence of habitat and different crop varieties.

Weeds that are well-suited to adapt to the impacts of habitats change may not only fill gaps left by more vulnerable native plants, they may have an even greater effect by altering the composition of ecosystems and their integrity. In fact, some factors like climate, fertilizers, quality of soils may favour certain native plants to such an extent that they then become weeds.

Table 3. *Presents the factor in planting areas in the Palembang and Indralaya.*

Place		Indralaya 1	Indralaya 2	Graduate school	Talang Keramat	Kebun Bunga
Fertilizers	**Organic**	+	+	-	+	+
	Inorganic	+	-	+	+	+
Soil condition	**Dry**	-	+	-	-	-
	Wet	+	-	+	+	+
Herbicides/Pesticides		-	-	-	-	+
The number of crop per field		changed	Not changed	changed	changed	Not changed

High temperature can reduce the competitiveness of native vegetation, providing new opportunities for weed invasion. Rainfall can spread weeds along watercourses into areas that were previously free of weeds. By washing away vegetation and exposing areas of disturbed soil, rainfall and humidity can also provide opportunities for new weed invasions by reducing competition from existing plants. Besides, dry soil conditions caused by high temperature prolong the longevity of the atmosphere; and importing fodder and grain into drought areas can bring new weed problems to the region. Fertilizers are chemicals that humans produce to kill the pestilent insect and weeds which is harmful to plants. From the survey in the field, almost farmers in Talang-karamat; Graduate school and Unsri campus in Indralaya did not use herbicides in growing of plants. However, in Kebun-bunga, the other farmer was using herbicides and insecticides about 3 times (before planting, when the plant begins to grow and after harvest) in their crop. They want to clear of weeds, which are highly infectious and harm the crops. This is the main reason for the difference species and diversity of weeds in the Kebun-bunga region compared to other areas. In addition, farmers was using organic and inorganic fertilizers such as chicken manure, cow manure, Urea, and TSP (Triple superphosphate) that provided nutrient for plant growth and development. Moreover, these farmers were using mattock or grass extractor for cutting down the weeds.

CONCLUSION

Through the research, results obtained by experiments that conducted in the fields of indralaya and palembang, indonesia has a total of 63 weed species. In this research, higher weed diversity was associated with higher species richness. The study showed that even a short period of organic cropping is beneficial for weed species diversity. The most likely reasons for the small differences in species composition were the relatively low intensity conventional cropping and the short period of cropping during which organic cropping had been practiced in our study fields. To determine the effect of climate on the growth (changing) of weed, it needs more time to do the research may be at least 3 seasons.

REFERENCES

1. Kropff M. J. and C. J. S. Spitters (1991), "A simple model of crop yield loss by weed competition from early observations on relative leaf area of the weeds", *Weed Res.*, 31, pp. 97-105.

2. Ministry of Environment, Republic of Indonesia (1999), *World Bank and Environmental in Indonesia.*

3. Pham Hoang Ho (1991), "Cây cỏ Việt Nam" Vol. 1, Pt. 1. Mekong Printing, Santa Ana.

4. Soerjani, Mohamad, Kostermans, Achmad Jahja, Citrosupomo, Gembong (1987), *Weeds of rice in Indonesia*.

5. Zinn K. E., Tunc-Ozdemir M., Harper J. F., J. Exp Bot (2010), "Temperature stress and plant sexual reproduction", *Uncovering the weakest links*, 61(7), pp. 1959-1968.

TÓM TẮT

NGHIÊN CỨU SỰ ẢNH HƯỞNG CỦA MÔI TRƯỜNG SỐNG VÀ CÁC LOẠI CÂY TRỒNG KHÁC NHAU TỚI THÀNH PHẦN VÀ SỰ ĐA DẠNG LOÀI CỎ DẠI TẠI CÁC KHU VỰC NGHIÊN CỨU Ở PALEMBANG VÀ INDRALAYA, INDONESIA

Vũ Khánh Linh[1*], Dương Văn Thảo[1], Lê Văn Việt[1], Arinafril[2]
[1]Trường Đại học Nông Lâm – ĐH Thái Nguyên
[2]Đại học Sriwijaya, Indonesia

Bài báo này đánh giá sự đa dạng của các loài cỏ dại trong các khu vực canh tác cây trồng khác nhau tại Palembang và Indralaya, Indonesia. Do sống trong điều kiện sinh thái đa dạng nên cỏ dại rất khó kiểm soát. Cỏ dại gây lên nhiều tác hại cho cây trồng như giảm năng suất và chất lượng nông sản do chúng có bộ rễ phát triển rất mạnh và phân bố chủ yếu ở lớp đất mặt nên dễ dàng cạnh tranh với cây trồng về dinh dưỡng, ánh sáng và nước. Kết quả nghiên cứu đã thu thập được 63 loài cỏ dại thuộc 55 chi và 32 họ đã được xác định. Trong nghiên cứu này tập trung phân tích một số yếu tố như: Mật độ và số lượng loài, môi trường sống, phân bón, các chất hóa học và điều kiện khí hậu của cỏ dại với các loại cây trồng khác nhau đã làm ảnh hưởng đến sự đa dạng của cỏ dại trong các khu vực nghiên cứu. Hiện nay, những nghiên cứu ban đầu đã cho thấy sự thay đổi về tính trạng sinh trưởng và phát triển của cỏ dại có liên quan chặt chẽ đến môi trường sống với các loài cây trồng; đặc biệt với một vài yếu tố quan trọng như điều kiện khí hậu, phân bón, chất hóa học.

Từ khóa: *Cây trồng mùa vụ, tính đa dạng, môi trường sống, phân bón, cỏ dại.*

Ngày nhận bài: 17/11/2017; Ngày phản biện: 28/11/2017; Ngày duyệt đăng: 30/1/2018

[*] *Tel: 01642 532867, Email: Vukhanhlinh115@gmail.com*