



Biosaintifika 10 (3) (2018) 500-509

# Biosaintifika

Journal of Biology & Biology Education

<http://journal.unnes.ac.id/nju/index.php/biosaintifika>



## Relationship of Bird Diversity and Plant Composition Inside The Area Campus Green Space of Universitas Padjadjaran Jatinangor, Sumedang West Java

✉ Deden Nurjaman, Teguh Husodo, Erri Noviar Megantara, Herri Y. Hadikusumah, Indri Wulandari

DOI: <http://dx.doi.org/10.15294/biosaintifika.v10i3.13543>

Department of Biology, Postgraduate Programme of Biology, Faculty of Mathematics and Sciences, Universitas Padjadjaran, Indonesia

### History Article

Received 26 February 2018  
Approved 19 September 2018  
Published 31 December 2018

### Keywords

birds; composition of plants; UNPAD

### Abstract

Padjadjaran University (UNPAD) Jatinangor is currently conducting green Campus program. To support the program, a study of biota living in it, as one of the benchmarks of good or bad environmental conditions, is needed. The green space of Jatinangor Campus is divided into two clusters namely Cluster I green space (Campus Forest) and green space Cluster II (Campus Non Forest). The objective of the research was to know the relationship between diversity of birds with diversity of plants in the green space of Cluster I (Campus Forest) and Cluster II (Campus Non Forest) UNPAD Campus Jatinangor as one of the parameters of successful development of green Campus. This research is descriptive-explorative with census method on bird species and plant composition from green spaces of Cluster I (Campus Forest) and Cluste II (Campus Non Forest) Campus UNPAD Jatinangor. From the observations in Cluster I, we identified 46 species of birds and 77 species of plants, whereas in Cluster II, we identified 32 species of birds and 74 types of plants. The number of bird species is directly proportional to the number of plant species from Cluster I and Cluster II green spaces. From this study it was concluded that the diversity of tree species supports the diversity of bird species.

### How to Cite

Nurjaman, D., Husodo, T., Megantara, E. N, Hadikusumah, H. Y., & Wulandari, I. (2018). Relationship of Bird Diversity and Plant Composition Inside The Area Campus Green Space of Universitas Padjadjaran Jatinangor, Sumedang West Java. *Biosaintifika: Journal of Biology & Biology Education*, 10(3), 500-509.

✉ Correspondence Author:  
Jl. Raya Jatinangor Km 21, Sumedang 45363  
E-mail: [dedentea.001@gmail.com](mailto:dedentea.001@gmail.com)

p-ISSN 2085-191X  
e-ISSN 2338-7610

## INTRODUCTION

Padjadjaran University (UNPAD) Campus Jatinangor located in Cikereuh Sub district, Sumedang regency, West Java. UNPAD has an area of  $\pm$  181 Ha. Geographically, UNPAD Campus Jatinangor is located between Mt. Manglayang and Mt. Geulis at coordinate of UTM 48 M 806340.52 m E; 9234142.39 m S, and altitude of 540-820 mdpl. UNPAD Campus Jatinangor has green space which is divided into two clusters, the first is Cluster I (Campus Forest), is a special green space or conservation Campus forest, consisting of 8 zones with 62.59 ha or 625951.01 m<sup>2</sup> area. The second is Clusters II (Campus Non Forest) green space, that is functioned as a public facility and student activity area, is divided into 22 zones with an area of 95.64 ha or 948693.9 m<sup>2</sup>. Greenspace UNPAD Campus Jatinangor covers around 85% of the 181 hectares of UNPAD Campus Jatinangor. The greenspace of UNPAD Campus Jatinangor exists for about 20 years, and has a standing trees category with tree trunk diameter of more than 30 cm, as well as diverse types of plants and the number of individuals of a high type.

UNPAD Campus Jatinangor is one of the university campus that has a green Campus program. Hitherto, good environmental benchmarks are not only related to solving several environmental issues such as pollution and energy, but also how the environment is able to support both human existence and other living things, such as plants and animals. The greater the ability of the environment to support the existence of living things in it (bird) means the better the quality of the environment.

Birds are one type of animal that is highly affected by forest land use change, especially on monoculture lands such as oil palm and rubber plantations. Severe decrease of forest trees and shrubs, causes loss of nesting sites, shelter and foraging for various species of birds. Meanwhile, birds have an important role in ecosystems such as pollinators, seed dispersers, pest control. Birds are also often favored by some people from the sound and beauty of their feathers (Ayat, 2011). Birds are part of biodiversity that must be preserved from extinction as well as decreasing species diversity. Birds have many benefits and functions for humans, both directly and indirectly (Yuda, 2000). The high diversity of bird species in an area is supported by high habitat diversity, because habitat for wild animals generally serves as a place to find food, drink, rest, and breed (Alikodra, 2002).

Vegetation structure is very important for a bird life, because it can be used as a residence, foraging, life cycle, and shelter from predators. If plant communities in an area continue to de-

crease, the number of bird species can be reduced, resulting in the loss of bird species (Susantao, *et al.*, 2016).

The number of bird species in Indonesia recorded 1,666 species (Susanti 2014) that are able to live in dense forest to the urban densely populated. One effort to get a picture of the supportability and quality of UNPAD Campus environment is to measure the diversity of plants and birds and the relationship among them. Plants become air purifiers because it absorbs CO<sub>2</sub> and pollutants in the air and optimizes water absorption in the ground. According to Boer (1998), the composition of plants also plays an important role in the utilization of habitat by birds. Plants provide food, shelter and protection for birds. Unwise environmental management can lead to environmental degradation, which impacts on the degradation of the quality and quantity of bird habitat. This leads to the scarcity and extinction of bird species due to the urgency and diminished vegetation of their life supporters. This makes birds widely used as bio-indicators to determine the quality and extent of environmental damage. It can be said that the more diverse species of plants and bird species in a region, the better the quality of the environment. Such information is important to serve as the basis for the management and development of the Campus area for the sake of conservation and education.

Based on the above explanation, the objective of the research was to know relationship between bird diversity and plant composition from Cluster I (Campus Forests) and Cluster II (Campus Non Forest) Campus spaces on Campus UNPAD Jatinangor. It is expected that the data obtained can be used as input in the development of Green UNPAD Campus Jatinangor program.

## METHODS

The research was conducted in Cluster I (Campus forest) and Cluster II (Campus Non forest), Padjadjaran University (UNPAD) Campus Jatinangor, from January to March 2017. This research is descriptive-explorative (qualitative) by using census method done on bird species and plant species from green space of Cluster I (Campus Forest) and Cluster II (Campus Non Forest) UNPAD Campus Jatinangor.

Observations were conducted to record the diversity of birds and the composition of plants from Cluster I green spaces (Campus Forests) and Cluster II (Campus Non Forests) Campus UNPAD Jatinangor. we collected the data by census method, i.e. inventory and record all species of birds and plant composition of plant category of stem dia-

meter at breast height (dbh)  $\geq 30$  cm and counted plant height. Bird diversity and plant composition data taken by recording all of the bird species and plant composition encountered during observations in the green space of the UNPAD Campus of Jatinangor. Day Observations were conducted at 06.00-17.00 WIB and night observations were conducted at 19.00-22.00 WIB. Crops data collection was conducted at the same time from 06.00-17.00 WIB.

**RESULTS AND DISCUSSION**

Plant Composition and Green Space in Cluster I (Campus Forests) UNPAD Campus Jatinangor from the green space Cluster I (Campus Forest) Campus UNPAD Jatinangor we found 77 plant species from 30 families and 1.858 the number of individual plants. The largest number of individual plants is *kemiri* (*Aleurites molucana*), accounted as many as 771 individual plants. The plant family that has the highest number of species is the family of fabaceae accounted for 15 species, i.e. *Akasia* (*Acacia mangium*), *Akasia* (*Acacia auriculiformis*), *Angsana* (*Pterocarpus indicus*), *Dadap cangkring* (*Erythrina microcarpa*), *Flamboyan* (*Delonix regia*), *Jengkol* (*Archidendron pauciflorum*), *Johar* (*Senna siamea*), *Kopi anjing* (*Cynometra cauliflora*), *Petai cina* (*Leucaena leucocephala*), *Petai* (*Parkia speciosa*), *Pohon kupu-kupu* (*Bauhinia purpurea*), *Saga besar* (*Abrus precatorius*), *Albasiah* (*Albizia falcataria*), *Sengon kebo* (*Enterolobium cyclocarpum*), and *Sono keling* (*Dalbergia latifolia*).

Green space Cluster I (Campus Forest) Campus UNPAD Jatinangor consists of 8 zones, out of the 8 zones, the zone that support the highest number of individual plants is zone 1 (Arboretum), as many as 72 types of plants and 575 the number of individual plants. Zone 1 (Arboretum) is the widest Zone (24,45 Ha) among the other zones. Zone I (Arboretum) has a plant with an average DBH of 45.54 cm, and an average tree

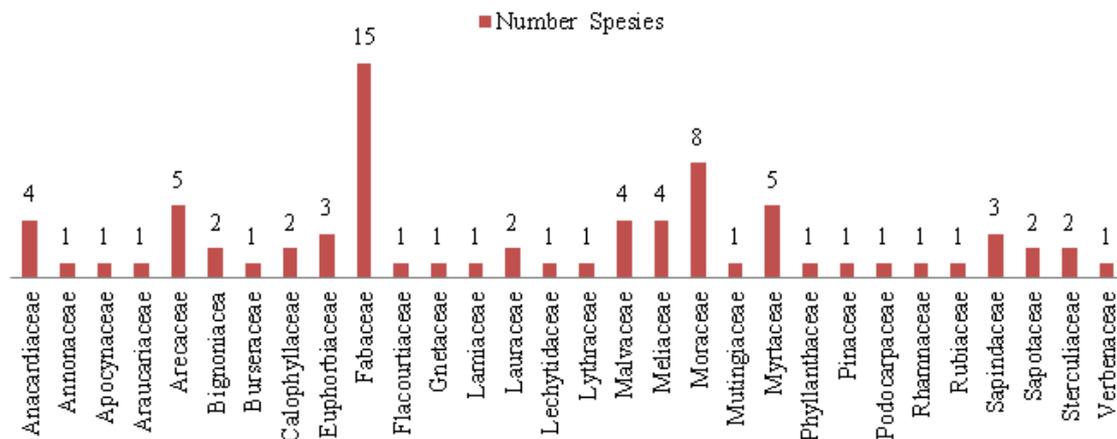
height of 16.17 m. plant species in zone I (Arboretum) grows rapidly and neatly, causing the temperature in zone I to be cooler, and sufficient for birds habitat such as for roosting site, sleeping site, nesting and feeding site. The composition and structure of vegetation is an important condition in habitat supporting the life of birds and other wildlife. The diversity of constituent species and vegetation structure in habitats affect the diversity of bird species (Bibby *et al.*, 2000).

**Bird Species Diversity in Green Space Cluster I (Campus Forest)**

Based on observations of bird species from Cluster I greenspace (Campus Forest) Campus UNPAD Jatinangor, we found 46 bird species from 25 families (Table 1). Family species of birds we most encountered is Cuculidae, i.e. Lesser Coucal (*Centropus bengalensis*), Javan Coucal (*Centropus nigrorufus*), Plaintive Cuckoo (*Cacomantis merulinus*), Rusty-breasted Cuckoo (*Cacomantis sepulcralis*), and Oriental Cuckoo (*Cuculus saturatus*). Observations in green space cluster I (Campus Forest) Campus UNPAD Jatinangor bird species are the most widely found in zone 1 (Arboretum) which is 32 species of birds.

Of the 46 species of birds, we found that there are several species that have been categorized as important conservation status according to the IUCN (International Union for Conservation of Nature). There is one type of Vulnerable (VU), Javan Coucal (*Centropus nigrorufus*) and other types belong to Least Concern (LC) status which means low risk. Vulnerable (VU) is that the species face high risk of extinction in nature because it has a 10% chance of extinction within 100 years.

There are four species of endemic birds of Java island in the green space of Cluster I (Campus Forests) UNPAD Jatinangor Campus is Javan Kingfisher (*Halcyon cyanoventris*), Javan Coucal (*Centropus nigrorufus*), Scarlet-headed Flowerpecker



**Figure 1.** Family Composition Based on Number of Plant Species

**Table 1.** Species of Bird Discovered In Green Space Cluster I (Campus Forests) Campus UNPAD Jatinangor

Family	Common Name	Scientific Name
Accipitridae	Black Eagle	<i>Ictinaetus malayensis</i>
	Crested Honey Buzzard	<i>Pernis ptilorhyncus</i>
Aegithinidae	Common Iora	<i>Aegithina tiphia</i>
Alcedinidae	Blue-eared Kingfisher	<i>Alcedo meninting</i>
	Cerulean Kingfisher	<i>Alcedo coerulescens</i>
	Javan Kingfisher	<i>Halcyon cyanoventris</i>
	Collared Kingfisher	<i>Halcyon chloris</i>
Ardeidae	House Swift	<i>Apus nipalensis</i>
	Glossy Swiftlet	<i>Collocalia esculenta</i>
	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>
	Black-Crowned Night – heron	<i>Nycticorax nycticorax</i>
Artamidae	White-breasted Wood-swallow	<i>Artamus leucorhynchus</i>
Campephagidae	Pied Triller	<i>Lalage nigra</i>
	Small Minivet	<i>Pericrocotus cinnamomeus</i>
Caprimulgidae	Savannah Nightjar	<i>Caprimulgus affinis</i>
Columbidae	Spotted Dove	<i>Streptopelia chinensis</i>
Cuculidae	Lesser Coucal	<i>Centropus bengalensis</i>
	Javan Coucal	<i>Centropus nigrorufus</i>
	Plaintive Cuckoo	<i>Cacomantis merulinus</i>
	Rusty-breasted Cuckoo	<i>Cacomantis sepulchralis</i>
	Oriental Cuckoo	<i>Cuculus saturatus</i>
Dicaeidae	Scarlet-headed Flowerpecker	<i>Dicaeum trochileum</i>
	Plain Flowerpecker	<i>Dicaeum concolor</i>
Estrildidae	Javan Munia	<i>Lonchura leucogastroides</i>
	Scaly-breasted Munia	<i>Lonchura punctulata</i>
Falconidae	Spotted Kestrel	<i>Falco moluccensis</i>
	Common (Eurasian) Kestrel	<i>Falco tinnunculus</i>
Hirundinidae	Pacific Swallow	<i>Hirundo tahitica</i>
Megalaimidae	Coppersmith Barbet	<i>Megalaima haemacephala</i>
Muscicapidae	Lesser Shortwing	<i>Brachypteryx leucophrys</i>
Nectariniidae	Olive-Backed Sunbirds	<i>Nectarina jugularis</i>
	Brown-throated Sunbirds	<i>Anthreptes malacensis</i>
Passeridae	Eurasian Tree Sparrow	<i>Passer montanus</i>
Phasianidae	King Quail	<i>Coturnix chinensis</i>
Picidae	Sunda Pygmy Woodpecker	<i>Dendrocopos moluccensis</i>
	Fulvous-breasted Woodpecker	<i>Dendrocopos macei</i>
Pycnonotidae	Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>
	Yellow-vented Bulbul	<i>Pycnonotus goiavier</i>
	Black-crested Bulbul	<i>Pycnonotus melanicterus</i>
Rallidae	White-breasted Waterhen	<i>Amauornis phoenicurus</i>
Sturnidae	Asian Glossy Starling	<i>Aplonis panayensis</i>
Sylviidae	Common Tailorbird	<i>Orthotomus sutorius</i>
	Ashy Tailorbird	<i>Orthotomus ruficeps</i>
	Olive-backed Tailorbird	<i>Orthotomus sepium</i>
Timaliidae	Horsfield's Babbler	<i>Malacocincla sepiaria</i>
Zosteropidae	Oriental White-eye	<i>Zosterops palpebrosus</i>

(*Dicaeum trochileum*), and Olive-backed Tailorbird (*Orthotomus sepium*).

Observation results obtained 3 species of birds that include government regulation No. 7 of 1999 on the Preservation of Plant and Animal Species. They are Spotted Kestrel (*Falco moluccensis*), Olive-Backed Sunbirds (*Nectarina jugularis*), and Brown-throated Sunbirds (*Anthreptes malacensis*). Three species of birds, including government regulation No.7 of 1999 and CITES Appendix II, were identified as rare, but can still be used in a limited way, including quotaing and monitoring system. They are Ictinaetus malayensis (*Ictinaetus malayensis*), Crested Honey Buzzard (*Pernis ptilorhyncus*), and Common (Eurasian) Kestrel (*Falco tinnunculus*).

Found four species of birds from Alcedinidae in green space Cluster I (Campus Forest) Campus UNPAD Jatinangor which including Government Regulation no.7 of 1999 on Preservation of Plant and Animal Species, and protected the Law No.5 year 1990 about Conservation of Natural Resource and its Ecosystem. They are Blue-eared Kingfisher (*Alcedo meninting*), Cerulean Kingfisher (*Alcedo coerulescens*), Javan Kingfisher (*Halcyon cyanoventris*), and Collared Kingfisher (*Halcyon chloris*). They are a type of clean water indicator birds. In accordance with Bibby *et al.*, 2000 which states that birds can be good indicators for biodiversity and environmental change.

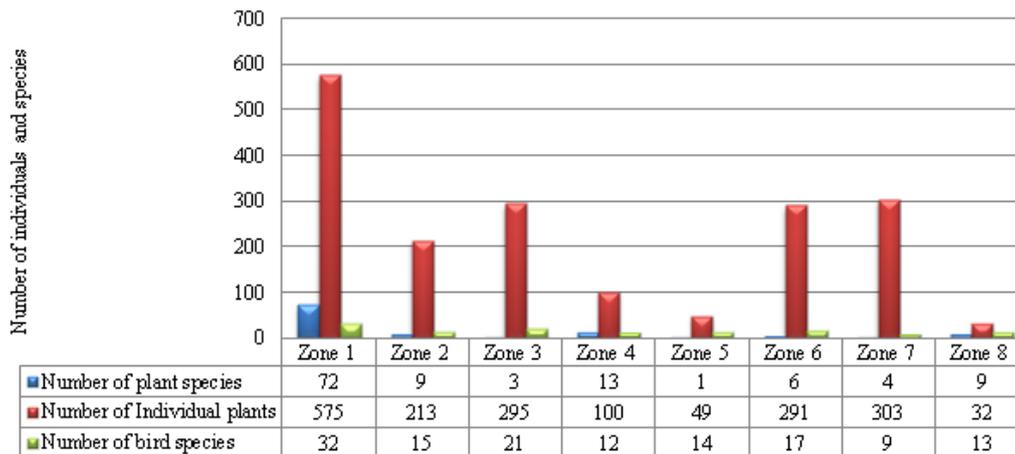
**Relationship Between Bird Diversity And Plant Composition In Green Space Cluster I (Campus Forest)**

Based on observations in green space clus-

ter I (Campus Forest) UNPAD Campus Jatinangor the relationship of diversity of bird species and plant species and the number of individual plants. This can be seen from Figure 2. Bird species comparison chart, crop type and number of individual plants from Green space Cluster I (Campus Forest) UNPAD Campus Jatinangor. The number of species and the number of individual plants is directly proportional to the number of bird species.

This means that the presence of bird species is strongly influenced by the lavishness of many or at least plants. Based on the observation of zone 1 (Arboretum) is the Zone that has the largest number of plants that is 72 species, and the largest number of individuals is 575 individuals, and has the largest number of bird species that is 32 species of birds. The diversity of bird species in a place is heavily influenced by habitat diversity and the quality of the habitat itself (Crozier & Niemi 2003; Davidar *et al.* 2001). Research Hernowo and Prasetyo (1989), states that the structure and composition of vegetation affect the type and number of birds contained in a habitat. This is because each species of bird has distinct niches and varied vegetation composition tends to attract more birds.

The diagram (Figure 2) shows that plants / plants are a very important habitat for birds. In general, bird habitat is an area that has the composition of plants in it. Plants / plants are used by birds as a habitat for nesting, sheltering, foraging, breeding and other activities. Different vegetation groups will show the diversity of different birds. Based on the observation of the presence of the number of plant species and the high number of individual plants



**Figure 2.** Comparison Of Bird Species, Plants Species And Number Of Individual Plants From Green Species Cluster I(Campus Forest) Campus Unpad Jatinangor

**Explanation:** Zone 1 (Arboretum), Zone 2 (Kemiri Garden), Zone 3 (Experimental Field and Veterinary Medicine), Zone 4 (Pertamina I Oxygen Tube), Zone 5 (Pertamina II Oxygen Tube), Zone 6 (Jawadan Madura Nursery, Posiyandu) , Zone 7 (Rubber Garden), Zone 8 (Mahogany Garden)

tend to attract more bird species and also very important to support its survival.

Bird activity found in green space Cluster I (Campus Forest) UNPAD Campus Jatinangor mostly done on the canopy of the tree either from the branching to the top of the tree. Many birds nest found in the tree canopy between the twigs are arranged tightly. In this case the tree plays a role as a cover / shelter from weather and predators, nesting, playing, chirping and resting (Hadinoto *et al.*, 2012). But there are also birds nesting in the canopy of trees but also on the soil surface such as Javan Munia (*Lonchura leucogastroides*), and Scaly-breasted Munia (*Lonchura punctulata*) for feeding and looking for nest material.

The number of plant species, the number of individual plants, and the number of bird species most commonly found in zone 1 (Arboretum), it is zone 1 (Arboretum) is one of the largest area of the campus area compared to other zones, the number of species and the number of individuals the most plants and the existence of age arboretum  $\pm$  27 years, meaning old and its existence is long. This condition is in accordance with Hadinoto *et al.* (2012) which states that the presence of bird species is caused by a variety of plant species, comfort and supporting habitats. Furthermore, the safety factor of various disturbances, structure and composition of vegetation type and location area can influence the number of bird species in a region.

There are two of birds species (woodpeckers) found in the green space Cluster I (Campus Forest) UNPAD Campus Jatinangor, Fulvous-breasted Woodpecker (*Dendrocopos macei*) and Sunda Pygmy Woodpecker (*Dendrocopos moluccensis*) (Table 1). The discovery of these two types of Fulvous-breasted Woodpecker (*Dendrocopos macei*), and Sunda Pygmy Woodpecker (*Dendrocopos moluccensis*). becomes very interesting because it shows that there is a group of old trees. Appropriate behavior that likes the old forest vegetation that will be used to make a hole and nest for feeding insects contained in tree trunks (MacKinnon *et al.*, 1998). The hole where the species of nest is found in *Albasiah* (*Albizia falcataria*), *Sengon buto* (*Enterolobium cyclocarpum*), *Bunut* (*Ficus virens*), *Suren* (*Toona sureni*), *Kelapa* (*Coccus nucifera*) L. and *Beringin* (*Ficus benjamina*).

Aside from being a cover / tree shelter has an important function in providing a source of feed. Several types of trees in the green space of Cluster I (Campus Forests) UNPAD Campus Jatinangor that produces food sources such as *Beringin* (*Ficus benjamina*), *Bunut* (*Ficus virens*), *Buni* (*Antidesma bunius*), *Beunying* (*Ficus fistulosa*), *Duwet* (*Syzygium*

*cumini*), *Kenari* (*Canarium indicum*), *Lamtorongung* (*Leucaena leucocephala*), *Petai* (*Parkia speciosa*), dan *Kosambi* (*Schleichera oleosa*).

In addition there are also plants that feed birds such as *Flamboyan* (*Delonix regia*), *Bunga kupu-kupu* (*Bauhinia purpurea*), *Nam-nam* (*Cynomera cauliflora*), *Belimbing* (*Averrhoa carambola*), *Randu* (*Ceiba pentandra*), *Bungur* (*Lagerstromia speciosa*), *Kersen* (*Muntingia calabura* L.), *Lengkeng* (*Dimocarpus longan*), *Mangga* (*Mangifera indica*), *Jambu air* (*Syzygium aqueum*), *Jambu dipa* (*Syzygium malaccense*), and so many parasites found in *bungur* tree (*Lagerstromia speciosa*), and *Beringin* (*Ficus benjamina*). Not only does it provide its parts as a source of food (leaves, flowers and fruits) a tree can serve as a habitat (niche) for many other types of organisms that feed the birds such as insects and other invertebrates.

### Plant Composition And Green Space In Cluster II (Campus Non Forest)

We found 74 plant species from 32 families and 1.912 the number of individual plants. Most individual plants are *Filicium decipiens* as many as 347 individual plants. The plant family that has the most number of species is *fabaceae* which is 16 kinds of plants, i.e. *kasia* (*Acacia mangium*), *Akasia* (*Acacia auriculiformis*), *Angsana* (*Pterocarpus indicus*), *Dadap cangkkring* (*Erythrina microcarpa*), *Flamboyan* (*Delonix regia*), *Jengkol* (*Archidendron pauciflorum*), *Kelor* (*Moringa oleifera*), *Trembesi* (*Samanea saman*), *Lamtoro gung* (*Leucaena leucocephala*), *Petai* (*Parkia speciosa*), *Pohon kupu-kupu* (*Bauhinia purpurea*), *Saga besar* (*Abrus precatorius*), *Albasiah* (*Albizia falcataria*), *Sengon kebo* (*Enterolobium cyclocarpum*), and *Sono keling* (*Dalbergia latifolia*) (Figure 3).

The green space of Cluster II (Campus Non Forests) UNPAD Jatinangor consists of 22 zones, from 22 zones obtained zones that have the most plant species and plant number of zone 4 (FMIPA UNPAD) as many as 30 types of plants and 152 the number of individual plants. The area of zone 4 (FMIPA UNPAD) is 2.80 Ha. Zone 4 has a plant with an average DBH of 35.54 cm, and an average tree height of 16 m. The existence of plant species in the zone of 4 types soils meeting, shade canopy cover and environmental conditions cool and shady.

### Bird Species Diversity In Green Space Cluster II (Campus Non Forest)

Diversity of bird species from green space Cluster II (Campus Non Forest) Campus UNPAD Jatinangor found 32 species of birds from 22 families (Table 2). Most bird species are *pycnonotidae*, i.e.; *Sooty-Headed Bulbul* (*Pycnonotus*

*aurigaster*), Yellow-vented Bulbul (*Pycnonotus goiavier*), and Black-crested Bulbul (*Pycnonotus melanicterus*). Of the 32 species of birds found to be of significant conservation status according to the IUCN (International Union for Conservation of Nature), all of which belong to the status of Least Concern (LC) means low risk. Based on Table 2 it is known that all of these birds are endemic to Sumatra, Java, Kalimantan and Bali (MacKinnon *et al.*, 2010). There are three species of endemic birds of Java island in Cluster II UNPAD Campus Jatinangor, i.e. Javan Kingfisher (*Halcyon cyanoventris*), Scarlet-headed Flowerpecker (*Dicaeum trochileum*), and Barn Owl (*Tyto alba*).

Three species of birds, including the government regulation No. 7/1999 on preservation of plant and animal species, namely Spotted Kestrel (*Falco moluccensis*), Olive-Backed Sunbirds (*Nectarina jugularis*), and Brown-throated Sunbirds (*Anthreptes malacensis*). Obtained two species of birds that include government regulation No.7 Year 1999 and CITES Appendix II, among others; Black Eagle (*Ictinaetus malayensis*), and Crested Serpent Eagle (*Spilornis cheela*). One species of birds are found in CITES Appendix I, namely Barn Owl (*Tyto alba*). Appendix II, namely the types of avifauna are considered rare, but still can be used in a limited way, among others through quota system (quota) and supervision. According to Surya, Novarino and Arbain (2013) nectar-sucking bird species function as plant pollinators.

Found 2 species of birds from alcedinidae in green space Cluster I (Campus Forest) Campus UNPADjatinangorwhichincludesGovernmentRegulation no.7 of 1999 on Preservation of Plant and Animal Species, andprotectedLawNo.5of 1990on Conservation of Natural Resources and its Ecosystem. The bird species are Halcyoncyanoventris, and Halcyonchloris. Both species of birds are species of clean water indicator birds. A bird species usually

requires specific environmental conditions and food species (Hadinoto, 2012).

### Relationship Between Bird Diversity And Plant Composition In Green Space Cluster II (Campus Non Forest)

Comparison of birds species, plants species and number of individual plants from green space Cluster II (Campus Non Forest) UNPAD Campus Jatinangor, zone 4 (FMIPA UNPAD) is a zoning that has the number of plant species, the number of individual plants, and the largest number of bird species. Cluster II plant type green plants are 30 species of plants, 152 the number of individual plants and 22 species of birds.

Species of Plants and Number of Individual Plants from Green space Cluster II (Campus Non Forest) UNPAD Campus Jatinangor, shows the number of species and the number of individual plants is directly proportional to the number of bird species.

Birds found in the green space Cluster II (Campus Non Forest) UNPAD Campus Jatinangor many activities in the canopy of the tree either from the branching to the top of the tree. Obtained one species of bird indicator group of old plants that Fulvous-breasted Woodpecker (*Dendrocopos macei*). The bird species are found nesting in Albisiah (*Albizia falcataria*), whose condition is old.

In the green space of Cluster II (Campus Non Forest) UNPAD Campus Jatinangor found trees species that produce feed sources such as *Beringin* (*Ficus benjamina*), *Buni* (*Antidesma bunius*), *Kenari* (*Cannarium indicum L*), *Petai cina* (*Leucaena lecocephala*), *Petai* (*Parkia speciosa*), and *Kosambi* (*Schleichera oleosa*).

In addition there are also plants that feed birds such as *Flamboyan* (*Delonix regia*), *Bunga kupu-kupu* (*Bauhinia purpurea*), *Nam-nam* (*Cynomera cauliflora*), *Belimbing* (*Averrhoa carambola*), *Randu*

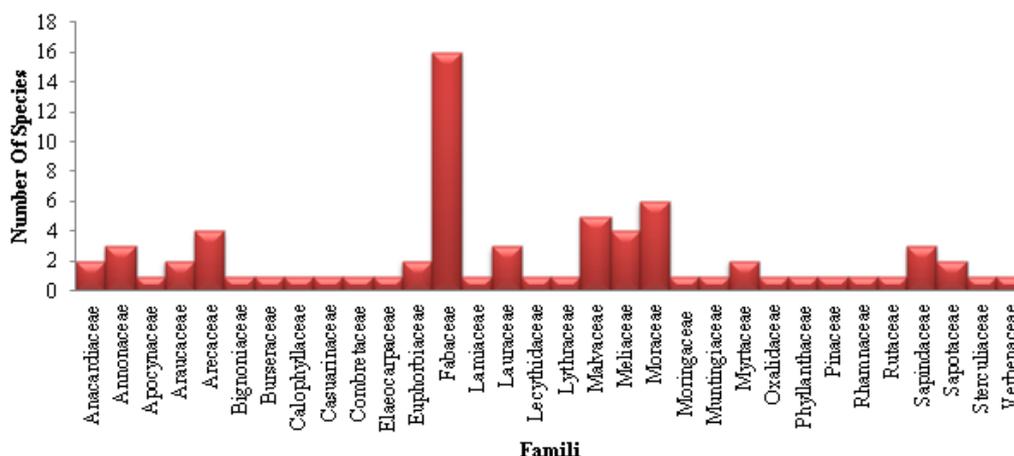


Figure 3. Family Composition Based On Number Of Plant Species

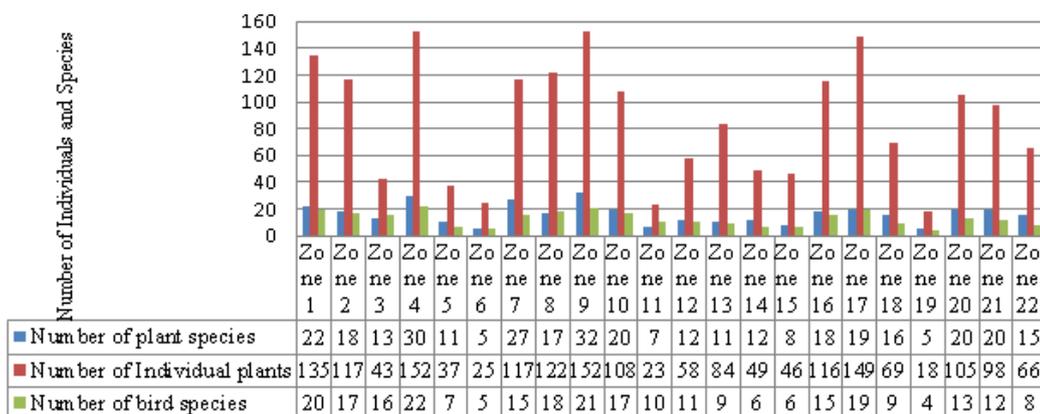
**Table 2.** The diversity of bird species from the Green Room of Cluster II (Campus Non forest) UN-PAD campus Jatinangor

Family	Common Name	Scientific Name
Accipitridae	Black Eagle	<i>Ictinaetus malayensis</i>
	Crested Serpent Eagle	<i>Spilornis cheela</i>
Aegithinidae	Common Iora	<i>Aegithina tiphia</i>
	Javan Kingfisher	<i>Halcyon cyanoventris</i>
	Collared Kingfisher	<i>Halcyon chloris</i>
Ardeidae	House Swift	<i>Apus nipalensis</i>
	Black-Crowned Night – heron	<i>Nycticorax nycticorax</i>
Artamidae	White-breasted Wood-swallow	<i>Artamus leucorhynchus</i>
Campephagidae	Pied Triller	<i>Lalage nigra</i>
	Small Minivet	<i>Pericrocotus cinnamomeus</i>
Columbidae	Spotted Dove	<i>Streptopelia chinensis</i>
Cuculidae	Lesser Coucal	<i>Centropus bengalensis</i>
	Rusty-breasted Cuckoo	<i>Cacomantis sepulchralis</i>
Dicaeidae	Scarlet-headed Flowerpecker	<i>Dicaeum trochileum</i>
Estrildidae	Javan Munia	<i>Lonchura leucogastroides</i>
	Scaly-breasted Munia	<i>Lonchura punctulata</i>
Falconidae	Spotted Kestrel	<i>Falco moluccensis</i>
Hirundinidae	Pacific Swallow	<i>Hirundo tahitica</i>
Megalaimidae	Coppersmith Barbet	<i>Megalaima haemacephala</i>
Nectariniidae	Olive-Backed Sunbirds	<i>Nectarina jugularis</i>
	Brown-throated Sunbirds	<i>Anthreptes malacensis</i>
	Eurasian Tree Sparrow	<i>Passer montanus</i>
Passeridae	Fulvous-breasted Woodpecker	<i>Dendrocopos macei</i>
	Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>
Pycnonotidae	Yellow-vented Bulbul	<i>Pycnonotus goiavier</i>
	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>
Strigidae	Collared Scops Owl	<i>Otus lempiji</i>
Sylviidae	Common Tailorbird	<i>Orthotomus sutorius</i>
	Ashy Tailorbird	<i>Orthotomus ruficeps</i>
Tytonidae	Barn Owl	<i>Tyto alba</i>

(*Ceiba pentandra*), Bungur (*Lagerstromieia speciosa*), Kersen (*Muntingia calabura L.*), Lengken (*Dimocarpus longan*), Mangga (*Mangifera indica*), Jambu air (*Syzygium aqueum*), Jambu dipa (*Syzygium malaccense*), and many parasites found in bungur tree (*Lagerstromieia speciosa*), and Beringin (*Ficus benjamina*). Only does not it provide its parts as a source of food (leaves, flowers and fruits) a tree can serve as a habitat (or niche habitat) for many other types of organisms that feed the birds such as insects and other invertebrates.

Plants provide resources for bird life that provides a source of feed and shelter as fundamental to survival. The more diverse the habi-

tat structure (the diversity of plant species and vegetation structure) the greater the diversity of animals (Dewi 2012). Habitats that have a wide variety of vegetation will provide more types of feed, so the choice of feed for birds will be more. The discovery of bird species is closely related to the condition of its habitat. Animals will choose habitats that have an abundance of resources for their survival, otherwise rarely or not found in an environment that is less favorable for them (Rohiyani 2014). In certain species the presence of competitors also affects the existence of birds in a region, especially species that need the same resources. In addition, external factors, especial-



**Figure 4.** Comparison Of Bird Species, Plants Species And Number Of Individual Plants From Green Space Cluster (Campus Non Forest) Cumpus Unpad Jatnanangor

**Explanation:** Zone 1 (West SME & MRU), Zone 2 (East Stadium and UKM), Zone 3 (Padjadjaran 3 Dormitory (Pharmacy Dormitory) and padjadjaran hall), Zone 4 (FMIPA UNPAD), Zone 5 (Faculty of Physics), Zone 7 (Vegetation in Ibnu sina, Padjajaran1, Padjajaran2, Fedka Puspa Sehat), Zone 8 (red field, PPBS, Biodas, Puriska), Zone 9 (Nursing, FK & FKG), Zone 10 (Location of Padjadjaran Dormitory, 4, 5, Student center, cow pen, poultry kangdang, sheep pen), Zone 11 (FISIP), Zone 12 (FIB), Zone 13 (FIKOM), Zone 14 (FEB & Balai), Zone 15 (Dormitory near rector), Zone 16 ( Faculty of Agriculture), Zone 17 (Faculty of Animal Husbandry), Zone 18 (FTIP, FTG, Pharmacy and FPIK), Zone 19 (Rector), Zone 20 (Agriculture d3, FPIK, and FTIP), Zone 21 (Agricultural greenhouse zone, saung meeting), Zone 22 (ciparanje).

ly environmental quality conditions (Lack 1969) such as temperature, pollution and human activity also affect the presence of birds in a region. The high number of species that can live in a habitat indicates that these habitats provide a good role for the existence of birds to find food, nest, and protect from predators (Rohiyani, *et al.*, 2014).

**CONCLUSIONS**

Green space cluster I (Campus Forest) UNPAD Campus jatnanangor has identified 77 species of plants from 30 families and 1.858 the number of individual plants and found 46 species of birds from 25 families. The largest number of plant species and bird species are found in zone 1 (Arboretum), which are 72 plant species and 32 bird species. The green space Cluster II (Not Campus Forest) Campus UNPAD jatnanangor identified 74 plant species from 32 families and 1912 number of individual plants, and found 32 species of birds from 22 families. Number of species of plants and most bird species found in zone 4 (FMIPA UNPAD), which is 30 species of plants and 22 species of birds. In general, the diversity of birds in Cluster I (Campus Forests) and Cluster II (Campus Non Forests) Campus spaces are directly proportional to the composition of the plant. Various species of birds and plant species indicate environmental conditions in the green spaces Cluster I (Campus Forests) and Cluster II (Campus Non Forests) Campus UNPAD jatnanangor still quite good

in supporting life in it.

**REFERENCES**

Alikodra, H. S. (2002). *Wildlife Management Volume I*. Book. Bogor Agricultural Institute. Bogor. 363p.

Ayat, A. (2011). *Agroforest birds in Sumatra*. World Agroforestry Centre. Bogor.

Bibby, C., Jones, M. & Marsden, S. (2000). *Bird Surveys*. Book. Mardi Yuana Vocational School. Bogor. 34-35 p.

Boer C. (1998). *Zur Bedeutung von Baumsturzluücken für die Verteilung und Abundanz von Vogelarten des Unterholzes in Primärund Sekundärregenwäldern Ostkalimantan*. [Report]. Würzburg, Würzburg.

Crozie, G. E., & Niemi, G. J. (2003). Using patch and landscape variables to model bird abundance in a naturally heterogeneous landscape. *Can J Zool* 81, 441-452.

Davidar, P., Yoganand, K., & Garsch, T. (2001). Distribution of forest bird in Andom Island important og leg habitat. *J Biogeogr* 28, 666-671.

Dewi, R. S., Mulyani, Y., & Santosa, Y. (2012). *Diversity of Bird Species in Several Habitat Types of Mount Ciremai National Park* (Report). Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry, Bogor Agricultural Institute, Bogor.

Hadinoto, Mulyadi, A., & Siregar, Y. I. (2012). Diversity of bird species in the forest of Pekanbaru City. *Journal of Environmental Sciences* 6(1), 25-42

Hernowo, J. B. & Prasetyo, L. B. (1989). Concept of

- Green Open Space in the City as Supporter of Bird Conservation. *Media Conservation*, 2(4), 61-77
- MacKinnon J., K. Philips, B. & Balen, V. (2010). *Birds in Sumatra, Java, Bali and Kalimantan*. Book. Research Center for Biology-LIPI. Bogor. 509 p.
- Rohiyan, M., Setiawan, A., & Rustiati, E. L. (2014). Diversity of bird species in the Pine and Mixed Forests of Muarasipongi, Mandailing Natal District, North Sumatra. *Sylva Lestari Journal*. 2, 89-98.
- Surya, D. C., Novarino, W. & Arbain, A. (2013). Bird species that utilize *Eurya acuminata* DC at Andalas Limau Manis University Campus, Padang. *Journal of Biology*, 90-95.
- Susanto, E., Mulyani, Y. A., & Suryobroto, B. (2016). Bird Communities In Seblat Nature Recreation Park (SNRP) North Bengkulu, Bengkulu. *J. Biosaintifika* 8, 25-32.
- Yuda, I. P., Nurcahyo, A. & Atmojo, H. (2000). (Abstract) Javan Hawk-eagle at Mount Merapi, Yogyakarta. Proceedings of the Second Symposium on Raptors of Asia. *The Indonesia Committee for the Second Symposium of Asian Raptor Research & Conservation Network*. Bogor. 206 p.