

I. INTRODUCTION

1.1 Research Background

Indonesia is known as a mega biodiversity country with more than 38,000 species of plants recorded widely throughout the country, not only with a richness of flora but diversity of fauna that attracts many parties both from within the country and abroad. Sumatra Island is one of the major islands in Indonesia with high biodiversity and extraordinary endemism. This richness is found in various types of ecosystems, and habitats ranging from lowlands to mountains (Susanti *et al.*, 2013).

The high biodiversity provides many benefits that can be felt directly or indirectly. Whilst directly, it can be felt that forest products can be used for daily needs, indirectly the forests have maintained the balance of the earth's ecosystem. Such benefits must be developed and preserved. One of the forest conservation areas in Indonesia is Taman Hutan Raya (Tahura). Tahura is a nature conservation area that aims to collect natural plants and animals, native and non-native species that can be used for research, science, education, supporting cultivation, tourism, and re-creation (UU No. 5 Tahun 1990). Indonesia has at least 22 areas that have been designated as Tahura. Tahura is usually located not far from urban areas or settlements that are easily accessible to the community.

Riau is one of the provinces that has conservation areas with high biodiversity intended for preservation, protection, and sustainable use (Dishut Riau 2016; MoEF 2016). One of the conservation areas that has a distinctive value in Riau Province is Sultan Syarif Hasyim Great Forest Park (Tahura SSH). Located between the borders of 3 Regencies / Cities in Riau Province, namely Pekanbaru

City precisely in Muara Fajar District, Siak Regency precisely in Minas District and Kampar Regency, Tapung Hilir District.

Since the establishment of Tahura SSH in Riau Province in 1999 based on the Decree of the Minister of Forestry and Plantations No.348 / Kpts-II / 1999 with an area of 6,172 ha, the management of Tahura SSH continues to decrease in function ecologically, socially, and a source of life for the surrounding community (Nurliah, 2016). The Production Forest Management Unit (in Indonesia: KPMP) Model of Minas Tahura (2015) shows that around 2,087 ha remain in the form of forest while 4,085 ha have been occupied by the community to be converted to oil palm plantations. The high occupation and cultivation of land by the community shows the inconsistency of Tahura SSH management policies (Insusanty and Azwin, 2014).

Biodiversity loss can also be a threat to the Tahura SSH ecosystem due to the rapid encroachment activities carried out by irresponsible individuals, which lead to the conversion of forests into oil palm plantations. In addition, the increase in the number of people in the Riau area, especially around Tahura SSH, has caused an increase in community needs for land, both for oil palm plantations and also used as a place to live (Sukma, 2019). Therefore, there is a possibility of degradation of plant and animal diversity in the Tahura SSH ecosystem due to the lack of awareness and knowledge of the surrounding community about the function Tahura SSH ecosystem. Moreover, threats to biodiversity arise not only as a result of overexploitation of natural resources, land use change, or climate change globally but can also be caused by the presence of unwanted invasive plant species.

The spread of invasive plants is one of the factors in decreasing of biodiversity, both from within the country and abroad which results in the pressed of native plant species (Radiansyah *et al.*, 2015). Invasive plants are plants that can multiply well beyond their original limits, so when introduced into other ecosystems can cause environmental damage, and economic losses and be harmful to human health (Brian *et al.*, 2002).

Invasive plants can come from native plant species or from external plant species that are intentionally or unintentionally brought into an ecosystem, which is able to develop very quickly in an environment. The characteristics of invasive plants include being able to grow quickly, reproducing quickly, having a high spreading ability, great tolerance to environmental conditions, and generally associated with humans (Wittenberg & Cock, 2001). The ability of invasive alien species to dominate all parts of a natural ecosystem and cause native species to become extinct. Alien species are not always invasive, and invasive species are not necessarily alien (Tjitrosoedirjo *et al.*, 2016). So it can be concluded that Invasive Alien Species (IAS) is a combination of alien species and invasive species. In forest ecosystems, invasive plants can quickly appear in deforested and degraded forests, but not all of them are able to reach forest interiors with relatively dense canopy cover, and most invasive alien plants are found outside the forest or in forest crevices (Junaedi and Dodo 2014).

Research done by Sahira *et al.* (2016) Sehati *et al.* (2022) showed that invasive plants that invade areas can be easier to be found at undergrowth plant vegetation. Undergrowth plants according to the definition of Whitmore (1991) are plants that have diameter of the stem (dbh) < 6.3 cm, such as tree saplings, shrubs,

herbs, ferns and climbing and creeping plants. Aththorick (2005) also provides a similar definition where undergrowth is a plant community that forms substratification near the surface of the soil. These plants generally consist of grass, herbs, bushes, shrubs and tree seedlings. These types of vegetation are annual, biannual or perennial with solitary, clumped, upright, spreading or climbing forms of life. Taxonomically, understory vegetation is generally members of the Poaceae, Cyperaceae, Araceae, Asteraceae, ferns and other tribes. This vegetation is found in many open areas, roadsides, river cliffs, forest floors, agricultural land and plantations.

The presence of undergrowth as a component of the plantation forest ecosystem has a positive impact. Maisyaroh (2010) explains that understory plants can function in infiltration and help block the fall of water directly and reduce the speed of surface flow so that it can inhibit or prevent rapid erosion. Other roles are as a source of biodiversity, protecting soil and soil organisms, helping create a microclimate on the forest floor, protecting the soil from the dangers of erosion, and maintaining soil fertility (Kunarso and Fatahul, 2013).

Undergrowth plants have an important role in maintaining the balance of natural ecosystems. Apart from that, undergrowth functions as a soil cover that maintains moisture, so that the decomposition process can take place more quickly to provide nutrients for plants (Irwanto, 2007). Apart from ecological functions, several types of understory plants have been identified as plants that can be used as food, medicinal plants and as alternative energy sources (Hilwan *et al*, 2013).

Various natural ecosystems in Indonesia have been invaded by invasive plants. According to the research of Sahira *et al*. (2016) conducted in Dr. Moh

Forest Park. Hatta found 18 invasive plant species with species that have the highest importance index, namely *Borreria laevis* and *Calliandra calothyrsus*. The Sultan Thaha Saifuddin Great Forest Area has been invaded by 9 types of invasive species with *Clidemia hirta* as the species with the highest importance value index (Nursanti and Adriadi, 2018). 18 invasive plant species have successfully invaded the Palu City Forest Park (Rasyid *et al.*, 2020). Found as many as 50 species of invasive plants in Ir. H. Djuanda Forest Park, especially in the families Compositae, Poaceae, and Acanthaceae (Surpiyatna *et a.*, 2022).

In addition to the Great forest park, invasive plants have also invaded other areas such as the Conservation Forest. Such as *Bellucia pentamera* species that have been distributed in the West Sumatra Conservation Forest which have been significantly distributed to cause a decrease in diversity at the level of trees, saplings, and seedlings (Solfiyeni *et al.*, 2022). Even in the Manokwari Gunung Meja Nature Park, 5 types of invasive plants were found, namely *Chromolaena odorata*, *Lantana cammara*, *Merremia peltata*, *Mikania micrantha*, and *Spathodea campanulate* (Yuliana and Lekitoo, 2018).

Based on a survey that has been conducted in the Sultan Syarif Hasim Forest Park, several types of invasive plants such as *Melastoma malabathricum* and *Cyperus Rotundutus* can easily be seen around the area. The existence of invasive plants in conservation areas and as tourism locations as well will certainly cause a decrease in diversity and reduce the aesthetic value of the area. Therefore, Sultan Syarif Hasim Forest Park, which acts as one of the conservation areas as well as natural tourism in Riau Province, should be maintained both ecologically and socioeconomically.

Based on these problems, it is important to conduct research on the Diversity of the undergrowth invasive plants species in the Sultan Syarif Hasim Great Forest Area, Riau Province. This research is expected to be used as a source of information about the diversity of invasive plant biodiversity and can be taken into consideration in efforts to manage, develop, and protect plant species in the Sultan Syarif Hasim Great Forest Area.

1.2 Research Problem

Based on the background above, the research problem for this research are as follows:

1. How is the composition of undergrowth invasive plants species in the Sultan Syarif Hasim Great Forest area, Riau Province?
2. How is the structure of undergrowth invasive plants species in the Sultan Syarif Hasim Great Forest area, Riau Province?

1.3 Research Objectives

Based on the background above, the research objectives for this research are as follows:

1. To determine the composition of undergrowth invasive plants species in the Sultan Syarif Hasim Great Forest area, Riau Province.
2. To determine the structure of undergrowth invasive plants species in the Sultan Syarif Hasim Great Forest area, Riau Province.

1.4 Research Benefits

The expected benefit of this research is that it can provide information about the types of undergrowth plants that have invaded the Sultan Syarif Hasim Great Forest area, Riau Province so that it can be used to determine the best action in order to manage, develop, and protect the diversity of other species in this area.

