

Distribution of Argentine Flies (*Cecidochares connexa* Macquart) as a Biological Control Agent of Siamese Weeds (*Chromolaena odorata* L.)

Abdul Muin¹, Idum Satia Santi^{1*}, Dicky Wahyud,¹ Agus Manto²

¹ Institut Pertanian Stiper Yogyakarta, Indonesia

² Akademi Komunitas Perkebunan Yogyakarta, Indonesia

*Corresponding author: idum@instiperjogja.ac.id

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ABSTRACT

This study aims to determine the level of attack and distribution of Argentine flies (*Cecidochares connexa*) as biological control agents against Siamese weed (*Chromolaena odorata*) in Gunungkidul Regency. The method used was a field survey in June–July 2024, with direct observation and sampling of host plants in four cardinal directions from the starting point of release (Wanagama I Forest). The parameters observed included the percentage of attacks, the number of gall, and gall holes per plant. The results showed that the highest attacks occurred in the Western region (72%), followed by the South (69%), the North (68%), and the East (49%). The average attack across the region reached 65%. *C. connexa* has become widespread and established in the Gunungkidul area.

Keywords: *Chromolaena odorata*, *Cecidochares connexa*, distribution, biological agents

INTRODUCTION

Siamese weed (*Chromolaena odorata* L.) is one of the invasive weeds that originated in Central and South America, and is now widespread in tropical and subtropical regions, including Indonesia. This weed has high adaptability and strong competitiveness with cultivated crops, and it produces allelopathic compounds that can inhibit the growth of other plants (Vaisakh & Pandey, 2012). Its presence reduces agricultural productivity, trade in plantation products, and harms livestock because it covers grazing fields.

Control *C. odorata* has been chemically carried out, but it negatively impacts the environment and health, and can trigger weed resistance. Therefore, the biological control approach using natural

enemies is one of the environmentally friendly and sustainable solutions (Cock & Holloway, 1982). Biological control using insects for weed control is one of the environmentally friendly and sustainable control techniques, including in *Chromolaena odorata* (Cock, 1984). Some insects have been studied as biological agents, such as Lepidoptera, Diptera, and Orthoptera (Modder, 1984). One of the biological agents that has been widely used is the Argentine fly (*Cecidochares connexa* Macquart), which works by forming a gall on the shoots of the host plant, thereby inhibiting the growth and reproduction of the weed (Aigbedion-Atalor et al., 2019).

The *C. connexa* fly was first released in Indonesia in 1993, and in the Wanagama I Forest area, Gunungkidul, in 1996. Until now, the latest evaluation of the distribution and establishment of the *C. connexa* population in the region is still limited. Therefore, this study aims to examine the

MATERIALS AND METHODS

This research was conducted from June to July 2024 in Gunungkidul Regency, Special Region of Yogyakarta. The method used is a field survey to observe and collect data related to the presence of gall in *Chromolaena odorata* weeds. Observations were made in four cardinal directions (West, East, North, South) from the starting point of the release of flies in the Wanagama I Forest.

The materials used are weeds *Chromolaena odorata* and *Cecidochares connexa* in the field,

RESULTS AND DISCUSSIO

The following is an overview of the distribution of tools in the Gunung Kidul area, starting from the Wanagama forest point



Figure 1. Distance of the spread of the Argentine fly to the West

Widely available land types of *C. odorata* in the West, namely, *Agroforestry*, moors, vacant land, and roadsides. The observed areas include the villages of Banaran, Ngleri, Pengkok, and Patuk, which border the Bantul area. The results of observations showed that the average percentage of gall batang attacks was 72%

level of attack and distribution of *C. connexa* flies against *C. odorata* weeds in Gunungkidul Regency, as a basis for evaluating the effectiveness of biological control carried out almost three decades ago.

while the tools used are stationery for note-taking, cameras, and hand counters.

The observed parameters include : Number of plant shoots observed. Number of shoots attacked by gall. Number of galls per plant. Number of gall holes as an indicator of larval activity

The percentage of attacks is calculated based on the number of shots showing purpuric symptoms. The results are processed in the form of graphs and tables.

The spread of flies in the Eastern region is shown in Figure 2 below.



Figure 2. Spread of flies eastward

The picture above shows that the fly has spread to a distance of 22 km, covering the areas of Logandeng, Wonosari, Semanu, Ngeposari, Sidorejo, and to the far end of Bedoyo. More weed populations are in the western region than the eastern region, so the attack presentation is 49%. However, it has spread further to the eastern region



Figure 3. Spread of flies northward

The spread of flies to the north reaches more than 22 km, with an average percentage of attacks of 68%. (Figure 3). The area passed through includes 11 villages ranging from Gading, Bunder, Nglegi, Ngalang, Kedungkeris, Kedung Poh, Pilangrejo, Natah, Beji, Kampung and Jurangjero, which is the end. Weeds are spread in several villages, so the distribution is more even, even though there are variations in the number of gall in each village.

The spread of flies in the southern region can be seen from Figure 4 below.

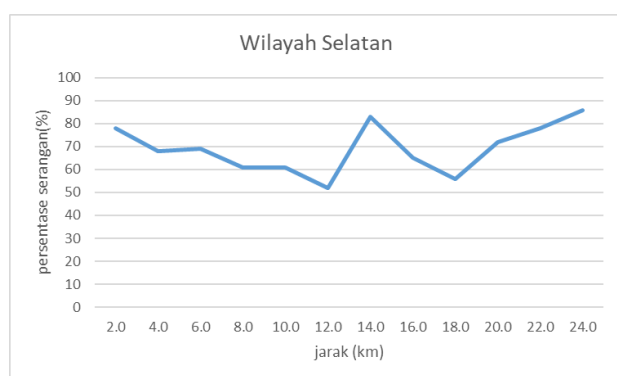


Figure 4. Southward spread of flies

The observation results include nine villages, namely Gading, Ngleri, Banaran, Plembutan, Grogol, Karangduwet, Karangasem, Mongol, Giring and Planjan, with a distance of 24 km. The average attack percentage is 69 per cent. Figure 4 shows that the spread of insects is quite far and has a relatively high attack rate. Because weeds grow

in the area on various types of land, such as vacant land, agroforestry, moors and roadsides. However, from the observation results, weeds are more prevalent in agroforestry areas.

The graph below shows the percentage of *C. connexa* fly attacks on galls in the four main areas of Gunungkidul Regency.

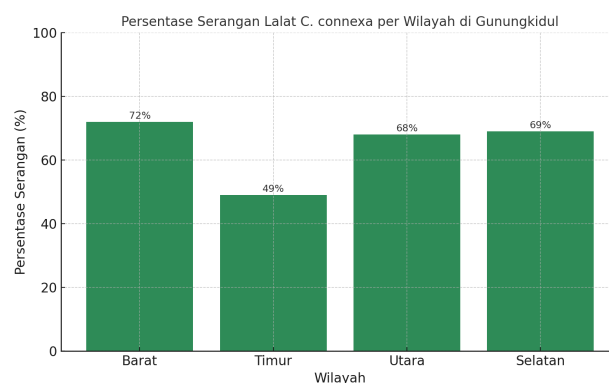


Figure 5. Graph of the percentage of *C. connexa* fly infestations in four central regions

The graph above shows that flies have a relatively high percentage of attacks, averaging 65 per cent. This condition shows that flies have been stable and established in the region. The percentage is relatively high because many fly host plants grow in the Gunungkidul area.

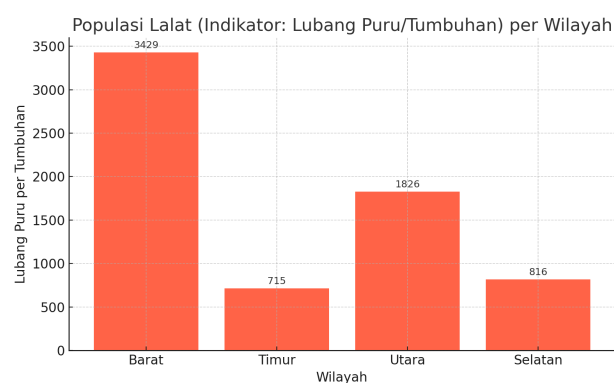


Figure 6. Fly population in four areas in Gunung Kidul Regency

The image above indicates the population of flies with an indicator of the number of holes in the gall, which is about 3500. However, this value is still rough because it is only calculated from the visible holes in the gall. A hole indicates a larva or cocoon

inside the gall, and when the hole is open, it indicates that the image of a fly has come out. However, this can still illustrate that the fly population *C. is related*. There are many, and they are spread quite widely. The large number of hosts influences the existence of flies themselves in a location (McFadyen et al., 2003)

The observations showed that the fly *Cecidochares connexa* has spread widely throughout the Gunungkidul Regency area. The highest percentage of attacks is in the West (72%), followed by the South (69%), the North (68%), and the East (49%). The average attack rate across the region is 65%. The success of the development of flies itself also depends on the climate and conditions that support the development of insects (Day et al., 2016). Although this fly is an introduced insect, it turns out to be quickly adapted to the surrounding environment and has spread in several regions in Indonesia (Day et al., 2011)

CONCLUSION

The *Cecidochares connexa* fly, a natural enemy of the weed *Chromolaena odorata*, has spread and formed an established population in Gunung Kidul Regency. The highest attack rate occurred in the West (72%) and the lowest in the East (49%), with an average attack across the region of 65%. *C. connexa flies* show high adaptability to a wide range of

This spread shows that the fly population has been established and can survive on various types of land, such as agroforestry, vacant land, moors, and roadsides. Factors that affect the difference in distribution between regions include soil type, topography, and the presence of host plants. The Western region has looser soils and denser vegetation, thus supporting the growth of *C. odorata* and the development of *C. connexa*.

Although the infestation rate is lower in the Eastern region, data show that the *C. connexa* fly can spread up to a radius of 22 km from the initial release point, indicating high ecological adaptability. This study confirms previous results from Jayadi (2001) and Harjaka & Mangoendihardjo (2010) that *C. connexa* populations can survive long-term and expand their invasion range against host weeds.

environmental conditions, with a distribution radius of 24 km from the initial release point in the Wanagama I Forest. The use of *C. connexa flies* as a biological control agent has proven effective and can continue to be developed sustainably to control invasive weeds.

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