The Incidence of Rhinoceros Beetle Outbreak in Public Coconut Plantation in Tanjung Simpang Village, Indragiri Hilir, Riau Province

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Keywords: Oryctes Rhinoceros, Outbreak, Breeding Site, Replanting, Coconut Plant.

Abstract: Indragiri Hilir is a Regency in Riau Province where about 70% of its population depend on coconut plantation. In 2018, a devastating outbreak of a coconut pest, Oryctes rhinoceros has been reported from several locations. The pest explosion in Tanjung Simpang Village, Pelangiran sub-district, has aroused conflict between coconut palm farmers and the oil palm plantation company in the area regarding the source of the pest infestation. An independent scientific investigation was conducted to address the problem. Steps carried out including survey, interview, field investigation, and trapping. Survey was carried out to determine the center of infestation by evaluating damage intensity through interview and field assessment by direct visual evaluation and with the aid of drone. Spotting of breeding site was done in the vicinity of plant infested area. Digging and delving breeding sites were done to assess the beetle and its larvae. Trapping using pheromone trap was intended to evaluate the beetle distribution. Interview was perfomed both to the coconut farmers and and the company staff to investigate the infestation chronology and activities in the oil palm plantation. The findings indicated through the research were then revealed to the both parties and also to the authority as elucidated in this paper.

1 INTRODUCTION

Coconut plantation plays the important roles for the economic, social and culture of most people in Indragiri Hilir Regency. Being "the tree of life", where every part of the plant possesses economic value, coconut from this area not only fulfills the domestic demand but also is potential as export commodity.

There are several factors that have been reported to act as rectricting factors of coconut production in Indragiri Hilir (Muhartoyo, 2017). One of them is the population explosion of a pest, the Rhinoceros beetle; Oryctes rhinoceros. The beetle is known as a global invasive pest particularly in coconut and oil palm (CABI, 2018; Manley et al., 2018; Sherley, 2000). Infestation of this pest is very destructive because could result in the plant to die, both for the young plants and the old ones (CABI, 2018; Chalapathi Rao et al., 2018). The population outbreak could be triggered by significant change of the environment particularly when ample breeding sites are available (Abidin et al., 2014; Balitka, 2010; Bedford et al., 2014; Marshall et al., 2017).

In Indragiri Hilir, massive infestation of this pest has been reported occurred in several areas. The infestation is estimated up to 1975.5 ha; 1192.5 being moderately infested and 783 ha severely damage.

Pest outbreak in public coconut plantation in Tanjung Simpang has provoked conflict because the farmers claimed that the source of the pest outbreak was the replanting activity conducted by the oil palm company in the vicinity. Since the oil palm company denied the claim, Indragiri Hilir Regency authority ordered scientific investigation to address the issue; which was agreed by both parties. Hence the scientific investigation was carried out.

2 METHODOLOGY

2.1 Time and Research Site

Study was conducted from January to May 2019.

Investigation was done in Tanjung Simpang Village, Sub-distrct Pelangiran in Indragiri Hilir; on both public coconut plantation and company oil palm plantation.

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DOI: 10.5220/0009145801510154
In *Proceedings of the Second International Conference on Science, Engineering and Technology (ICoSET 2019)*, pages 151-154
ISBN: 978-989-758-463-3

2.2 Survey

Survey activity was conducted through interviewing coconut farmers whose plants affected by the infestation of Rhinoceros beetle, regarding their sociocultural and understanding of the pest infestation. Oil Palm plantation officials were also interviwed regarding their activity that might have affected the pest outbreak. Related information was also obtained from village officials.

2.3 Field Investigation

In public coconut plantation, field investigation was done by assessing the plant damage through direct visual evaluation and with the aid of drone. Spotting breeding site was also perform in the vicinity by digging and delving the potential breeding site then collecting and counting the speciments. Sistematik assessment was conducted in every 100m distant from the boundary of oil palm plantation, through visual damage evaluation and trapping using the synthetic pheromone of the beetle at 150m interval.

In the oil palm plantation, investigation was carried out by spotting the possible breeding site of the beetle. Field assessment was also perfomed to evaluate the condition of the field and the new replanting oil palm.

2.4 Disclosure of the Reseach Findings

After twice visits and field assessment to the both public coconut plantation and oil palm plantation, data gathered then studied thoroughly. Supported with ample scientific information to the data obtained, the findings then formulated and presented to each party and regency authorities.

3 RESULTS AND DISCUSSION

3.1 General Information about Tanjung Simpang Village

Tanjung simpang village is located in Sub-district Pelangiran with the area of 222 Km2 and inhabitate by 16 726 people. Most of the people in this area depend on coconut plantation. The distance of the village to the sub-district capital is 60 km, while that of from the regency capital is 80 km, however the main transportation was through water that could be reached in about 2 hour.

The oil palm plantation company is located adjacent to the village, covered 83 000 ha. The history of oil palm first planting was started in 1996 on the land initially forest. Starting in 2015, the company decided to replant the oil palm tree due to the poor condition aggravated by the disease caused by Ganoderma funggus. The replanting plan was conducted in stages as shown in Figure 1.

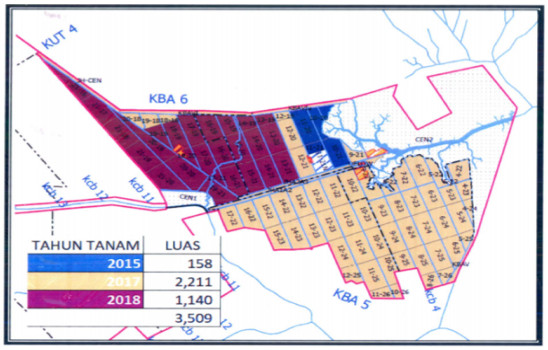

Figure 1: Replanting Stages Executed by Oil Palm company.

3.2 Results from Field Assessment

From field observation it was found that infestation ranged from 50 % to 100 %. Such massive damage is imminent if Oryctes population outbreaks is not suppressed immediately (Chung, 2012; Marshall et al., 2019). The damage symptom caused by the Rhinoceros beetle was very clear (Figure 2), which were the fan like cut on the opened coconut leaf and the holes at the base of coconut leaf midrib (ACIAR, 2017; Domberg, 2015).

The level of infestation affected by the distant of the coconut palm plantation to the company oil palm plantation. The severe damage was observed within the area adjacent to and up to 100m from the company oil palm plantation, then gradually decreased by the increasing distance from the company oil palm plantation. Photos captured with a drone also reveals the phenomenon (figure 3).

Digging and delving of the potential breeding site of the beetle revealed the present of the beetle and its larvae (Figure 4).

All coconut trees found up to 1100 m from the company oil palm plantation were attacked by the beetle twith various intencity as shown in the Figure 5.

Average number of beetles captured using pheromone trap was also derceased by inreasing distance from the company oil palm plantation which were 137, 88, 66 and 49 respectively for every 150

Figure 2: Symptoms of Oryctes rhinoceros infestation.

Figure 3: The condition of coconut plantation adjacent to the company palm plantation.

Figure 4: The beetle and its grubs located in the breeding site spotted in adjacent area to the company palm oil plantation.

m interval away from the palm oil plantation. The use of pheromone-baited trap could be used as a tool to locate the occurrence of the pest outbreak (Moolen and Dowdy (2001, in (Ahmad and Kamarudin, 2011)), besides to control the pest population (Allou et al., 2006).

3.3 Other Findings

There are additional findings that could be taken into account. Firstly, the chronology of the beetle infes-

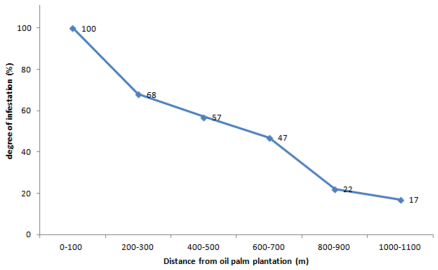

Figure 5: Level of Rhinoceros infestation related to the distance toward the palm oil plantation.

tation symptoms (started in the end of 2017 and getting severe by 2018) was synchron with the replanting activity by the company. The life cycle of insect such as this beetle vary greatly depending on the food source and environmental conditions (Kamarudin et al., 2005; Khaliq et al., 2014; Kumashiro et al., 2014). Nuriyanty et al. (2016) reported that the life cycle of this beetle was approximately 4 months in Purbalingga regency. Secondly, the replanting was conducted due to the poor condition of diseased palm oil tree caused by Ganoderma. According to Kamarudin and Wahid (2004), poor stand of palm trees infected by Ganoderma could be a suitable habitat for initial build up population of the beetle. Pasaribu and de Chenon (2005) also highlighted the report by PPKS (1996) emphasizing that replanting oil palm previously infected by Ganoderma provided suitable media for population build up of the beetle. Thirdly, replanting provided abundant breeding sites for the beetle (Abidin et al., 2014). Eventhough the company officials claimed that proper SOP for replanting had been executed, remnant of the trunk was still found consisting of the beetle and its grub. Fourthly, The farther the location from the company palm oil plantation, the lesser the infestation and also the fewer the beetle captured; indicating the center of pest outbreak. Fiftly, the legume cover crop planted which was intended to further conceal the buried chipping material, did not grow as expected. Vegetation such as legume cover crop is crucial to suppress oviposition by female beetle (Wood, 1969; Vargo, 2000), therefore could break the insect cycle, (Clark, 2007). Lastly, the most important step that should have been done but was neglegted was anticipation, socialization and extension to the society in the area that might have been affected by replanting activity, since replanting site has been widely known as breeding ground for this pest (Manjeri et al., 2014; PEI, 2019).

4 CONCLUSION

With the above data and finding, it was concluded that the damage on the coconut plantation was resulted by the infestation of Rhinoceros beetle, Oryctes rhinoceros. The pest population outbreak was resulted from replanting activity of the company oil palm plantation.

ACKNOWLEDGEMENTS

The authors wish to thank Indragiri Hilir Regency Authority for funding the study, and the Indragiri Hilir Plantation Office for the accompeniment of the field investigation.

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