



Research Article

Effects of the pests to *Nauclea orientalis* plantation forest at the first year aging in Quy Chau district, Nghệ An province

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Abstract

Nauclea orientalis is grown in Quy Chau district under the project of Nghe An Department of Science and Technology. *Nauclea orientalis* plantation for large timber supply, is being encouraged in Vietnam, mainly in the Southern and Northern provinces. However, there are often a number of pests and diseases that affect its growth and development. Leaf-eating caterpillars (*Moduzaprocris cramer*) damage with the harm rate from 13.2% to 13.8%; level of harm is from 0.24% to 0.27%. So conclusion is the leaf worm (*Moduzaprocris cramer*) in the studying area with mild damage.

1. Introduction

Forestry production constantly requires research and selection of valuable plants species to add on the crop structure group. This activity not only enriches the species of forest products, diversifying silviculture, meeting the requirements of forest business, but also creates opportunities for promoting the advantages of each locality, especially in the trend of the forest wood product market is expanding, the demand for wood products is increasing, the number of products is increasing day by day. Therefore, the research and development of promising plant species is a right direction, in line with the process of sustainable forest management in our country today [1, 4].

Gao vang (*Nauclea orientalis* (L)) is a native species; naturally distributing in northern Australia, New Guinea, Viet Nam, Malaysia Myanmar and Thai Lan. It has been successfully grown in Costa Rica, Puerto

Rico, South Africa, Surinam, Taiwan, Venezuela, tropical and sub-tropical countries [4].

This species is being cultivated in Vietnam, mainly in the South West Region. However, to intensive plantation, there are number of damaging pests that often appear. Research on pests and diseases of *Nauclea orientalis* in Indonesia has identified the larvae of some beetle species that often feed on roots and damage trees at the age of 1-2 years [5]. Another research in Indonesia reported fungal and foliar pests, but the plants usually get recovered well after that [6].

Research on composition of leaf-eating caterpillars (*Moduzaprocris Cramer*), it usually eats part of the leaf blade or the whole leaf flesh and leave only the veins. Leafworms commonly damage fruit and vegetable crops in Bangladesh [7].

The results of the study on the composition of the butterfly beetles showed that the leafhopper species distribution was found in India [8] in Nam Ka Nature Reserve, Dak Lak and in Phu Mat National Park, Nghe An, Vietnam [1]. In Vietnam, there have been programs to plant *Neolamarckiacadamba* and *Nauclea orientalis* forests, focusing on the southern provinces. In the models of plantation of *Neolamarckiacadamba* and *Nauclea orientalis* in Ca Mau province, two consecutive pest waves have been recorded in the year and appeared since 2015. This article presents the results of the investigation and identification characteristics of the pests. eating leaves harms the *Nauclea orientalis* plantation in Quy Chau district [3].

2. Materials and methods

2.1. Morphological characterization and identification

Sampling of phases including: adult, egg, larva and pupae, detailed description of shape, size, color, antennae, forewing, hindwing... and compare with Inayoshi's classification key [9, 10] for identification of *Nauclea orientalis* leaf worm.

2.2. Assessment of the harmful situation

Pests and diseases investigation: Set a standard plot of 25 m² (12 standard plots), counting the total number of plants in the Standard Plots and at the same time to investigate pests and diseases on trees by branches (2 base leaves, 2 middle leaves and 2 top leaves in different directions). Plants are in investigation marked with red paint streaks to avoid confusion, sample surveys according to the standards of pest investigation in the textbook of plant diseases and insects of the Viet Nam National University of Forestry.

- Time of investigation: one in every month (from 12th to 15th)

- Pest status survey: Classification of damage levels for surveyed plants in standard plots according to 5 levels of damage [2].

Table 1. Classification of damage levels

Level of damage	Condition of foliage under investigation
0	The plant is healthy, the foliage is not harmed
1	< 25% foliage damaged
2	25- 50% foliage damaged
3	51- 75% foliage damaged
4	>75 % foliage damaged

The rate of plants affected by pests was determined by the formula:

$$P\% = \frac{n}{N} * 100$$

Of which: n number of damaged plants; N is total number of surveyed plants

The average damage level in is calculated according to the formula

$$R\% = \frac{\sum_{i=0}^4 nivi}{NV}$$

- R (%) is the average degree of harm
- ni is the number of plants damaged at harmful class i
- vi is the value of harmful class i
- N Total surved plants
- V Highest harmfulness level value (V=4)

The degree of harmfulness is determined based on the average level of harm (R), specifically as follows:

Table 2. Level of harmfulness

R=0	Plants are not affected by pests
0,0 < R ≤ 1,0	Plants slightly damaged
1,0 < R ≤ 2,0	Plants with average damage
2,0 < R ≤ 3,0	Plants with bad damage
3,0 < R ≤ 4,0	Plants with heavy damage

Study period: from October 2019 to March 2020

3. Results and discussion

3.1. Pests damaging *Nauclea orientalis*

The results of the pest and disease investigation performs the resistance to adverse conditions and the resistance to pests and diseases and is an important and indispensable indicator in the breeding work. It represents the adaptation of the variety to the regional ecological environment. Tolerance to adverse conditions and resistance to pests is highly dependent on cultivars, cultivation techniques and climate. If a variety has good growth potential, but has poor tolerance to adverse conditions and poor resistance to pests and diseases, are considered not a good variety. It is therefore, accurate assessment of resistance to adverse conditions and resistance to pests will help the selection of varieties in general and the selection of *Nauclea orientalis* cultivars in particular, and the selection of good variety will facilitate subsequent afforestation. The results of the survey are shown in Table 1.

Table 3. Situation of caterpillars harmful to *Nauclea orientalis* species in Quy Chau district

Investigation time	Caterpillars		
	Rate of harm (P%)	Level of harm (R)	Level of damage
1st time	13,6	0,23	Light damage
2nd time	13,2	0,24	Light damage
3rd time	13,8	0,25	Light damage
Average	13,53	0,24	Light damage

From the Table 3, the presence of caterpillars can be seen (*Moduzaprocris Cramer*) but at a mild level, there are no signs of affecting the growth and development of *Nauclea orientalis* species on the specific study area.

- At the first follow-up: The harm rate is 13.6%, the level of damage of 0.23 concludes the level of damage is mild

- At the 2nd follow-up: The harm rate is 13.2%, the level of damage 0.24 concludes that the damage is mild

- At the 3rd follow-up: The harm rate is 13.8%, the level of damage 0.25 concludes that the damage is mild.

Commenting on the pest situation in the study area, it can be seen that the pest rate is at a slight level of damage because in this period the plants grow strongly, so its resistance to the environment is good and *Nauclea orientalis* a favorite plant and it is the light loving plant that grow fast in the early stages, so the resistance to the external environment is better. This is true with the growth rules of forest plant and coincides with the research outcomes of Ngon Van Thao, Nguyen Van Chien and the other authors on the growth of *Nauclea orientalis* species

3.2. Morphological and biological characteristics of insects and pests to *Nauclea orientalis*.

- *Mature*: Adult upper side reddish-brown, underside light reddish-brown (Fig. 2 & 3), forewings 1 row each with 8 white spots and an additional 1 point near base of wings, hind wings with 1 row of 7 white colored spots, wing tip with 3 small black lines. Average wingspan 56mm, length 20.5mm

- *Egg*: green, 1 mm diameter

- *Baby worm*: young caterpillars, 5 years old of color and size change with age+ Age 1: The young caterpillars are pale green, with small spines on the body, the average length is 4.8mm. (Fig. 4)



Figure 1. The caterpillar eats the leaves of a 1-year-old *Nauclea orientalis* plantation forest in Quy Chau district



Figure 2. Mature upper side **Figure 3.** Mature underside



Figure 4. The young caterpillars Age 1



Figure 5. The young caterpillars Age 3

+ Age 2: Brown body, with 9 pairs of spines running along the dorsal edge, the average length of the body is 7.8mm.

+ Age 3: Body brown, with 9 pairs of spines running along the dorsal edge, the average length of the body is 14.5mm. (Fig. 5)

+ Age 4: Brown body, with 9 pairs of spines running along the dorsal edge, the average length of the body is 22.5mm.

+ Age 5: Gray-brown body, with 9 pairs of spines running along the dorsal edge, the average length of the body is 38.2mm. (Fig. 6)

- Pupa: Brown, average length 18.5mm (Fig. 7).



Figure 6. The young caterpillars Age 5



Figure 7. Pupa

Classification results: Based on morphological characteristics, the Caterpillars to *Nauclea orientalis* was identified as *Moduza procris* Cramer (Lepidoptera; Nymphalidae).

4. Conclusions

Nauclea orientalis plantation forest project is implemented by the Nghe An Department of Science and Technology. Plantation site is in Quy Chau district. During the investigation, a leafworm (*Moduzaprocris* Cramer) appeared in planted forests at the age of 1 year old with mild damage as follows: Harm rate 13.2% to 13.8%, Level of harm from 13.2% to 13.8%. 0.25% to 0.27%

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References

1. Composition of butterflies (Lepidoptera: Nymphalidae) in Nam Ka Nature Reserve, Dak Lak. The 6th National Scientific Conference on ecology and biological resources: pp.551 -555.
2. Textbook of insects and plant of Viet Nam National Forestry University.
3. The 6th National Scientific Conference on Ecology and Biological Resources
4. Orwa, C.; Mutua, A.; Kindt, R.; Jambadass, R.; Simons, A. Agroforestry Database: a tree reference and selection guide version 4.0, 2009. (<http://www.worldagroforestry.org/af/treedb/>)
5. Intari, S.E.; Natawiria, D. White grubs in forest tree nurseries and young plantations. Laporan Lembaga Penelitian Hutan. (167). Bogor, Indonesia. 1973, 2p.
6. Soerianegara, I.; Lemmens, R.H.M.J. Plant resources of South-east Asia 5 (1). Timber trees. Major commercial timbers. Pudoc Scientific Publishers, Wageningen, Netherlands: 1993, 555p.
7. Tahsinur, R.S. Checklist of butterflies of Chuadanga District, Bangladesh. Journal of Entomology and Zool. Studies. 2014, 2(5), 218-224.
8. Swarnali, M., Soumyajit, B., Goutam, K.S., Parthiba, B. and Gautam, A., Butterfly diversity in Kolkata, India: An appraisal for conservation management. J. Asia-Pacific Biodivers. 2015, 8, 210-221.
9. Inayoshi, Y. A check lish of Butterflies in Indo - China (Chiefly from Thailand, Laos and Viet Nam). 1996-2006. Souse material: <http://yutaka.it-n.jp/>.
10. Monastyrskii, A.L. Butterflies of Vietnam, Vol 1, Nymphalidae: Satyrinae. Cartographic Publishing House, Hanoi, Vietnam, (35 col). 2005. pp198.