Preliminary study: Introduction pest of long bean flowers in South Sulawesi

S N Aminah1, A Nasruddin1, T Abdullah1, Fatahuddin1 and Syatrawati2

1Pests and Plant Diseases Department, Faculty of Agriculture, Hasanuddin University Jl. Perintis Kemerdekaan km. 10 Tamalanrea Makassar 90245 Indonesia
2Food Crop Production Technology, The State of Agricultural Polytechnic Pangkep Jl. Poros Makassar – Pare-Pare km. 83 Mandalle, Pangkep 90655 South Sulawesi Indonesia

Email: srifirnas@gmail.com

Abstract. Long bean (Vignaunguiculata ssp. sesquipedalis) family Leguminosaeas the famous vegetable in Asia, growth widely at lowland and highland including Indonesia. The purpose of research is to identify pest of long bean flowers in farmer field that reduce loss yield. The survey about presence of insect-pest incidence conducted at long bean field in Pakkabba village, north Galesong district, Gowa Regency, South Sulawesi (5°14’8”S, 119°24’1”E) in July 2019. Visual observation in long bean field was conducted diagonally in fivesampling points (used 10 long bean flowers from three plants per sampling point). The sample contained symptoms of long bean pest were collected, identified and recorded. The result show spotted pod borer Marucatetulalis Geyer (Lepidoptera: Crambidae) after mass rearing pest in laboratory. Based the survey, this is potential pest caused loss yield of long bean and need more working manage it.

1. Introduction

Rice Long bean (Vignaunguiculata ssp. sesquipedalis) family Leguminosaeas the famous vegetable in Asia, growth widely in lowland and highland. Commonly long bean more suitable in lowland with warm temperature although can grow in highland more than 800 m above sea level. Long bean are an ancient vegetable with many wild varieties of these plants still growing in tropical Africa, where they were likely introduced from Southeast Asia [1,2]. The long bean commonly also known as the long-podded cowpea, asparagus bean, snake bean, or Chinese long bean. Long bean is not closely related to other beans such as pole bean, bush bean and snap bean (French beans) because all of them which belong to a different genus altogether. However, long bean is more closely related to black-eyed peas. When harvested, long bean is never stiff or crisp like green beans. They are most valued for their retention of color and texture when used in cooking such as stews, stir-fried or salad. Many people in Southeast Asian including Indonesia eating leaves of long bean because good source of protein, vitamin A, vitamin C, thiamin, riboflavin, minerals such as P, Mg and Mn [3].

Marucatetulalis Geyer (Lepidoptera: Crambidae) as spotted pod borer synonym with legume pod borer and mung moth) [4,5]. M. testulalis as the important pest in Leguminosae spread in worldwide including Ceylon, Cambodia, India, north America, Africa, Fiji island, Indonesia, Australia and Papua New Guinea [2,6,7]. In Indonesia, M. testulalis attacked many crops in Sumatera and Java [8].
M. testulalis is known as important pest caused damaging to legume in the tropic and they has many host plants. In long bean, M. testulalis infested bud, flower, stem, pod and seed. The ability to damage it at various levels of plant growth caused of long bean failure [9,10].

The yield loss by M. testulalis activities has a major impact on the long bean. Also yield loss in various legumes due to this pest is estimated at 25 - 60%. M. testulalis caused damage to cowpea (Vignaunguiculata) with yield losses that can reach 70%. Approximately 25% damage occurs in soybean (Glycine max Merr.) [6,11–14]. The spectrum of pest is wide and practically every part of the plant especially cowpea (V. unguiculata) has an adopted pest species. The pest status of the different insects may vary from one country to another [2].

In long beans, these pests cause damage to plant and reduce the quantity. Many treatments controlled presence insect pest in long bean especially insecticides application [8,10,15]. Unfortunately, they are not effective because the pest cover by petals of long bean flowers. The heavy symptom will causes long bean flowers dry out and fall from the plant. The condition makes yield loss of long bean as important crops [12]. Beside presence of pests, climate change as very important factor in long beans production. Based Oyerinde et al. and Sharma et al. [2],[16] state that global warming and climate change as majotr factor in agriculture production and food security. Climate change can affected on insect-pest incidence, genotypic susceptibility to insect damage especially in pigeonpea (Cajanuscajan). Recently, this fact is very interesting in long bean flowers in farmer field. The purpose of research is to identify pest of long bean flowers (V. unguiculata ssp. sesquipedalis) in farmer field

2. Methods
The survey about presence of pest was conducted at long bean field in Pukkabba village, north Galesongdistrict, Gowa Regency, South Sulawesi (5°14′8″S, 119°24′1″E) in July 2019. The elevation of field survey is 32 m above sea level. Visual observation in long bean field forming diagonally in fivesampling point (used 10 long bean flowers from three plants per sampling point). The sample contain symptom of long bean pest were collected, identified and recorded. The sample was carried out to laboratory and observation of their development. The adult of pest were identified using magnifying glass. Identified of pests in long bean flowers used scientific sources [4,5]. Secondary data management about pesticides application from farmer interview.

3. Results and discussions
The observations flowers of long bean was conducted in 30 days after planting. The result showed from mass rearing long bean flowers symptom from field, the adult identified as Maruca testulalis Geyer (Lepidoptera: Crambidae) [4,5] in figure 1.

![Figure 1. Spotted pod borer Maruca testulalis Geyer on long bean flowers](image)

In general, first infestations in the long bean field occurred when the female moth of M. testulalis lays eggs in the soft bud contain more nutrition. This condition commonly in the vegetative phase. The first instar larval of M. testulalis caused damage in bud and young stem which results in stunted plant growth. Damage by the late instar larval often results plant tissue death in the upper part of the larval hole. After attacking the bud, the larval will damage flowering phase. Besides the bud, the female moth of M. testulalis will lay their eggs on the flowers. The damage in the flowering phase will greatly reduce the potential for plants forming flowers and pods [10–12,17]
Typical symptoms in long bean flowers are the presence of frass and silk produced by *M. testulalis* larval. The affected tissue is woven together using larval silk. The larval borer the shoots, flowers and pods of the attacked plants. Symptoms of long bean flowers presented in figure 2.

Figure 2. Symptom of *M. testulalis* larval at long bean flowers

Aldywaridha and Chittibabu et al., [8,11] state that damage long bean flowers generally occurs when larval make holes in and out parts from the flower. Early instar larval bore and eat inside young flowers and caused flowers fall. In another report, Echendu and Akingbohungbe [1] state that generally *M. testulalis* larval do not eat the petals, but are more interested in broaching into the crown tube. The initial and mature instar larval will damage the reproductive parts of the long bean flower starting from the anthers, pistil stalks, pistil heads and ovaries. Early instar larval prefer open flowers and eat their ovaries. This condition makes plant cannot form pods.

The first instar larval very mobile and attacked 4 to 6 flowers to complete their life cycle. In general, larval migrate from one flower to another immediately after eating the reproductive part of the flower. The process transferring to other flowers takes place quickly because the silk thread produced by the larval. Before forming a cocoon, the mature instar larval borer and eat pod and seed tissue. Young pods are completely damaged by eating larval, whereas in older green pods the larval eat some seeds that are developing, but not all seeds in one pod are damaged by the larval. Echendu and Akingbohungbe, Ekesi et al., and Sharma [1,7,12] state in cowpea, *M. testulalis* damages about one third of the seeds in the pods that are attacked, whereas in the *C. cajan* eat almost all the seeds that are developing in the pods. Mahalakhsmi et al., [6] state that in many cases, after consuming one or two seeds, the larval moves and borer to another pod. In addition, beside fresh pods larval can also infest dry pods. The cocoons formed are protected by interwoven silk threads and lumps of dirt which are attached each other. Damage due to *M. testulalis* is easily recognized from the outside appearance. The larval make holes in the shoots, stems, flowers and pods. The large entry holes covered with brown frass that encourage and improve secondary fungus pathogen attack on pods.

An interesting fact in field, the near long bean plantations has a building of swallow nest. Commonly swallow playing roles as insectivores in ecosystem. It is suspected that swallow in nature contribute preying adult of *M. testulalis* and other insect pests, unfortunately no data are available for these activities. This finding of the research very useful manage presence of *M. testulalis* attacked long bean flowers.

4. Conclusions
The conclusion of the observation is: spotted pod borer *M. testulalisas* insect pest in long bean flowers.

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