Performance of Rice Production and Pest in Riau Province

Rustam

1Riau Assessment Institute of Agricultural Technology, Jl. KH Nasution No. 341 Pekanbaru, Indonesia

E-mail: rustamriau@gmail.com

Abstract. Production of rice plants is affected by pest attacks. This study aimed to (i) analyze the trend of rice production and pest in Riau Province over the past 10 years, (ii) to predict the trend of pests and rice production of Riau Province for the next 5 years, and (iii) to formulate policy alternatives in order to increase rice production and pest attack control in Riau Province. Secondary data covering production data and paddy pests were obtained from related institutions. For validation and completion of some secondary data, the primary data was collected from direct observation and various competent sources. The data were analyzed in tabulative, regression and simple descriptive to answer the research objectives. The results showed that there has been a decline in rice production in Riau Province for the last 5 years was quite high (23.0%). The decline in production is mainly due to a decrease in harvested area. The decline in production is also caused by pest attacks. The type and extent of rice pest attack show a fluctuating trend. There are 8 types of pests causing rice crop failure (puso), namely bird, rice bug, golden apple snail, stem borer, brown spot disease, blast, and bacteria leaf blight. The total area of rice pests attack by category of puso 161.4 ha. In the next 5 years, Riau rice production is predicted to increase every year while pest attack will decrease every year. Rice production can be increased through increasing harvested area, reducing land conversion, water availability. While pest attack can be suppressed through the use of resistant varieties, early detection, simultaneous control, and intensify counseling.

1. Introduction

The need for food, especially rice every year is always increasing. Increased rice demand follows population growth rate. The total rice requirement reaches 636.680 ton/year to supply the needs of Riau Province's population of 6.3 million people. Population growth in Riau Province is quite high with the growth rate estimated at 3.6% while the average rice production over the past 10 years tends to decrease with the production amount per year is only about 285.022 tons (459.13 tons of dry mill rice) so that there is a deficit of rice by 351.658 ton (55%) each year [1].

On the other hand rice production in Riau Province in the last 10 years is decreasing. The average decline in rice production is about 3.6%/year (13.816 ton) [1]. Ironically, nationally the production of paddy commodity every year keeps increasing, which is about 3.4% [2]. Various factors are accused of causing a decrease in production, including reduced planting area, low productivity, climatic factors, and attack of pest. Pest attack can decrease production significantly. Types of rice pests that often cause heavy damage to puso (crop failure) include: rats, brown plant hopper, stem borer, blast disease, tungro disease, bacterial leaf blight disease.

Nevertheless, efforts to increase rice production in Riau Province continue to be done. Since 2009-2014 through a national program to increase Rice Production has been conducted through the activities of “Sekolah Lapang Pengelolaan Tanaman Terpadu” (SLPTT) in various food production centers in Riau. Then the Riau Provincial Government itself since 2009-2013 has also conducted “Operasi Pangan Riau Makmur” (OPRM), with 3 main activities, namely increasing the
index of cropping, rehabilitation of abandoned paddy fields and expansion of planting area through new rice field printing activities. Furthermore, since 2014 efforts to increase rice production by the Central Government have been continued through “Program Upaya Khusus” of rice, corn, and soybeans (Upsus Pajale). In Upsus Pajale activities, all strategies and efforts are made to increase planting area and pajale productivity in food production center areas including in Riau Province for national food sovereignty to be achieved. Operationalization of Upsus Pajale program is supported by the provision of funds, mobilization, repair of irrigation networks, fertilizer assistance, availability of superior seeds, tractor assistance and agricultural machinery tools and marketing certainty [3].

The increase in production needs to be continuously improved so that the needs of the increasing number of population can be fulfilled. But the challenge of increasing production in the future is also increasingly associated with climate change and the threat of pest attack [4]. Associated with plant pests, it is important to know which plant pests are always dominating along with their level of attack so that the mitigation measures can be anticipated early on.

Based on the above explanation, this study aimed to analyze production performance and rice pest attack in Riau Province in the last 5-10 years.

2. Materials and Methods

This study basically uses secondary data obtained from several related institutions, such as Badan Pusat Statistik (BPS) Indonesia, BPS of Riau Province, Unit Pelaksana Teknis (UPT) Perlindungan Dinas Pertanian of Riau Province, and other relevant institutions. From BPS Indonesia obtained data of production, harvested area, and productivity of paddy, corn and soybean at national and provincial level. From BPS of Riau Province obtained data: (i) production, harvested area, and productivity of rice, corn, and soybean plants at district level; (ii) land area data based on district level type and land use; (iii) population data; and (iv) other relevant data. Meanwhile, from UPT of Protection of Food Crops Department of Riau Province obtained cumulative data of the pest attack covering the type and extent of district-level paddy rice pest attack in the last 5 years.

Each type of pest groups grouped into four levels of attack category, as mild, moderate, severe, and puso. The attack category is based on the level (percentage) of pests or diseases that attack the plant. Here are the details of the attack category and the level of attack of each pest group [5].

| Category of attack | Attack rate (%) | Phytophagous Insect | Disease |
|--------------------|---------------|---------------------|---------|
| Light              | ≤ 25          | ≤ 11                |
| Medium             | > 25 - ≤50    | > 11 - ≤25          |
| Weight             | <50 - ≥85     | <50 - ≥85           |
| Puso               | ≥85           | > 85                |

For validation and supplementing some secondary data, primary data were collected from competent sources either through interviews directly or through discussion activities or group meetings on various occasions. At the time of extracting primary data also collected other related field information, such as information about pest control techniques conducted in several rice production centers in Riau Province. The data obtained were analyzed by simple tabulative and descriptive.

3. Results and Discussion

3.1 Performance of Production, Harvests, and Productivity
Production of rice in Riau Province in the period of 2008-2017 tends to decrease, with average annual production decrease reach 13,816 tons. The decline in rice production was mainly due to the reduced rice harvest areas throughout the year 2008-2017. The area of rice harvest in the year 2008 covering 147,796 ha then in 2017 was reduced to 92,683 ha, or a reduction of 55,113 ha (37%) (Figure 1).

Figure 1. Production (a), harvested area (b), and productivity (c) of rice in Riau Province in 2008-2017.
If analysis of rice production per regency in Riau Province in the last 10 years (data not shown), the drastic decrease of production occurred in Rokan Hilir Regency. Rice production in Rokan Hilir regency in 2011 amounted to 158.344 tons and in 2015 fell to 50.056 tons, or decreased 108.288 tons (68.4%) [1]. If the production decline does not occur in Rokan Hilir Regency, in other words, the production in 2015 is the same as the production in 2011, the Riau Province's rice production as a whole will be relatively stable.

Rokan Hilir regency is one of the main production centers of rice in Riau Province so that the decrease of production that occurred in the district has a significant effect on total rice production in Riau Province. From some sources [6,7] it is known that the cause of the decline in rice production in Rokan Hilir Regency is mainly caused by the rampant conversion of food land into non-food land, especially oil palm. As an illustration, the total increase of oil palm area in Rokan Hilir Regency for the last 5 years is about 165,992 ha (7.4%) [1].

In addition, rice productivity in Riau Province is relatively low. The average productivity per year in Riau Province during 2011-2015 is 3.58 tons/ha [1]. This productivity is well below the national average productivity over the last 5 years of 5.14 tons/ha. Rice productivity in Riau Province is also relatively low when compared with rice productivity in neighboring provinces, including: Jambi Province of 4.32 tons/ha and South Sumatra Province of 4.52 tons/ha [2]. In terms of land conditions in the two neighboring provinces are relatively similar to the conditions of land in Riau Province.

The low productivity of paddy in Riau Province is caused by rice production area in Riau consist of 13% of paddy fields and 77% wet rice field [1]. As it is known that the productivity of paddy fields is generally much lower than the productivity of lowland rice so low productivity value will decrease the overall productivity of rice. In addition, wetland land in the form of tidal paddy fields is the dominant rice field type in two main production centers in Riau Province, namely Indragiri Hilir and Rokan Hilir Regency, with productivity of lowland rice is usually also lower than the productivity of dryland paddy.

Another thing that can cause low productivity of rice in Riau Province is the attack of rice pests. During the 2011 - 2015 timeframe has been reported there are 22 types of rice pests that attack rice crops. Of the 22 types of pests, 8 types of pests cause crop failure (puso) with a total area of attack 161.4 ha and 9 types of pests cause severe damage with total area of attack 124.05 ha (Table 2). The details of the type and extent of the respective pest attack are described in the performance of pest section of this paper.

The decrease of production and harvest area in Riau Province in the period of 2011 - 2015 indicate that the programs of increasing the production of rice either coming from the central government, such as “P2BN program” and “self-sufficiency program pajale” or program coming from local government, such as program of “OPRM” and other local program can not be considered successful. In the case of national, “P2BN program” for the year 2011-2014 were considered successful due to an increase in rice production of 65.76 million tons in 2011 to 70.85 million tons in 2014, up about 2%/year. Similarly, the “pajale program” launched by the central government in 2014 has increased rice production from 70.85 million tons in 2014 to 75.40 million tons in 2015, up by 6.4% per year. Although for the pajale program there was also an increase in rice production in Riau, from 385.475 tons in 2014 to 393.917 tons in 2015 [2,1] but within the last 5 years increase in rice production in Riau Province can be considered not successful.

3.2 Rice Pests Performance

From the extensive cumulative data added to the rice pest attack in Riau Province in 2011-2015 issued by TIU of Protection of Food Crops Department of Riau Province, it was reported that there are 22 types of pests that attack rice plants. Of the 22 types of paddy pests, 8 types of pests can cause harvest failure (puso) and 9 types of pests can cause severe damage. The eight types of pest that can cause puso are bird, mouse, sardine, mulberry snail, stem borer, brown spot disease, blast, and leaf blight. Then 9 types of pests that can cause
severe damage such as orong-orong pests, earthworms, pigs, fake white pests, brown planthopper, cutworm, midrib blight disease, and iron poisoning (Table 2).

Among the pests reported to attack rice crops, birds are the most destructive pest species in Riau Province. The average area of bird pest attack per year reaches 455.2 ha. During the period of 2011 - 2015, every year bird pests always cause heavy damage to rice crops, with an average damage of 27.8 ha/year. Then bird pest also has caused puso rice plants as much as 3 times, namely in 2011 area of 35.85 ha, the year of 7 hectares of land, and the year 2014 area of 24 ha. In addition, there is a tendency that the extent of bird pest attacks always increases annually (Table 2).

Many species of birds cause rice yield loss. In Riau province there are 12 species of birds belonging to 4 orders, 8 families, and 9 genera that attack rice plants [8]. Species of the bird are *Babulcus ibis*, *Halcyon smyrnensis*, *Hirundo rustica*, *Lonchura leucogastroides*, *L. maja*, *L. punctulata*, *L. striata*, *Padda oryzivora*, *Passer montanus*, *Pycnonotus goiavier*, *Prinia familiaris* and *Streptopelia chinensis*. According to [9] the preferences of a particular type and population of birds that come right to attack rice plants closely related to the amylase content in the rice variety.

Bird pests begin to interfere when the rice is seeded, rice is still young, rice yellowing until ready to harvest. The birds usually nest near the house, the low trees and the bushes around the rice fields. Although the rate of bird consumption per tail is relatively small, such as Bondol Peking and Bondol Jawa which are only 2-2.8 gram/day [10] but because the population is thousands when eating rice that can cause a considerable loss of yield.

### Table 2. Extent of rice pests attack in Riau Province in 2011 - 2015.

| Pest name     | Category of attack | Area of attack (ha) |          |          |          |          |          |          |          |          |
|---------------|--------------------|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|
|               |                    | 2011                | 2012     | 2013     | 2014     | 2015     | Average  |          |          |          |
| Bird          | Light              | 246.7               | 250      | 287.1    | 381.2    | 419.7    | 316.9    |          |          |          |
|               | Medium             | 90.51               | 29.15    | 105.8    | 116.1    | 143.9    | 97.1     |          |          |          |
|               | Weight             | 60.5                | 17.2     | 2.9      | 56.5     | 2        | 27.8     |          |          |          |
|               | Puso               | 35.85               | 7        | 0        | 24       | 0        | 13.4     |          |          |          |
|               | Amount             | 433.6               | 303.35   | 395.7    | 577.8    | 565.6    | 455.2    |          |          |          |
| Rats          | Light              | 676.9               | 670.89   | 643.5    | 428.4    | 487.5    | 581.4    |          |          |          |
|               | Medium             | 141.1               | 203.21   | 217.2    | 112.5    | 209.9    | 176.8    |          |          |          |
|               | Weight             | 7.25                | 41       | 46       | 9.8      | 21.4     | 25.1     |          |          |          |
|               | Puso               | 3.8                 | 33.6     | 0        | 0        | 1        | 7.7      |          |          |          |
|               | Amount             | 829                 | 948.48   | 906.6    | 550.8    | 719.8    | 790.9    |          |          |          |
| Rice bug      | Light              | 1383                | 731.78   | 770.2    | 382.5    | 609.9    | 775.5    |          |          |          |
|               | Medium             | 57.6                | 137.81   | 167.9    | 94.77    | 139.9    | 119.6    |          |          |          |
|               | Weight             | 9.3                 | 11.1     | 12.5     | 2.1      | 18       | 10.6     |          |          |          |
|               | Puso               | 25                  | 5        | 2        | 0        | 0        | 6.4      |          |          |          |
|               | Amount             | 1475                | 885.69   | 952.6    | 479.4    | 767.8    | 912.1    |          |          |          |
|               | Light              | 140.8               | 122.92   | 68.8     | 81.65    | 98.45    | 102.5    |          |          |          |
|               | Medium             | 11.65               | 46.01    | 28.7     | 17.3     | 40.25    | 28.8     |          |          |          |
| Pest name          | Category of attack | 2011  | 2012  | 2013  | 2014  | 2015  | Average |
|--------------------|--------------------|-------|-------|-------|-------|-------|---------|
| Brown spots        | Weight             | 3.2   | 10.8  | 0.4   | 0.5   | 35.9  | 10.2    |
|                    | Puso               | 10    | 0     | 0     | 0     | 0     | 2.0     |
|                    | Amount             | 165.6 | 179.7 | 97.9  | 99.45 | 174.6 | 143.5   |
| Snails             | Light              | 209.3 | 128.6 | 115.1 | 201   | 183   | 167.4   |
|                    | Medium             | 80.4  | 45.5  | 60.16 | 119.9 | 57.7  | 72.7    |
|                    | Weight             | 15.7  | 4     | 12.8  | 2.5   | 5     | 8.0     |
|                    | Puso               | 7.45  | 0     | 0.3   | 1.8   | 0     | 1.9     |
|                    | Amount             | 312.9 | 178.1 | 188.4 | 325.2 | 245.7 | 250.1   |
| Bacterial leaf blight | Light             | 400.1 | 162.2 | 90.5  | 110.2 | 78.53 | 168.3   |
|                    | Medium             | 22    | 58.25 | 38.1  | 20.32 | 35.9  | 34.9    |
|                    | Weight             | 16    | 24    | 0.1   | 4     | 0     | 8.8     |
|                    | Puso               | 0     | 0     | 0     | 2.5   | 0     | 0.5     |
|                    | Amount             | 438.1 | 244.45| 128.7 | 137   | 114.4 | 212.5   |
| Blast              | Light              | 247.7 | 268.85| 173.7 | 231.6 | 331.2 | 250.6   |
|                    | Medium             | 47.7  | 34.2  | 63.25 | 77.3  | 113.5 | 67.2    |
|                    | Weight             | 0.1   | 0.6   | 0.1   | 1.65  | 22.7  | 5.0     |
|                    | Puso               | 0     | 0     | 0     | 1.5   | 0     | 0.3     |
|                    | Amount             | 295.5 | 303.65| 237   | 312   | 467.3 | 323.1   |
| Stem borer         | Light              | 506.5 | 455.7 | 583.5 | 427.7 | 635.9 | 521.9   |
|                    | Medium             | 50.78 | 87.16 | 224.7 | 62.11 | 210.2 | 127.0   |
|                    | Weight             | 31.7  | 10.1  | 55.4  | 1.8   | 58.5  | 31.5    |
|                    | Puso               | 0     | 0.2   | 0.4   | 0     | 0     | 0.1     |
|                    | Amount             | 589   | 553.18| 864   | 491.6 | 904.6 | 680.5   |
| Mole cricket       | Light              | 85.41 | 89.05 | 81.84 | 88.59 | 80.3  | 85.0    |
|                    | Medium             | 24.24 | 13.69 | 22.96 | 54.89 | 47.1  | 32.6    |
|                    | Weight             | 0.5   | 0.4   | 0.1   | 1     | 34.6  | 7.3     |
|                    | Puso               | 0     | 0     | 0     | 0     | 0     | 0.0     |
|                    | Amount             | 110.2 | 103.14| 104.9 | 144.5 | 162   | 124.9   |
| Black bugs         | Light              | 657.8 | 303.7 | 63.3  | 192   | 137.2 | 270.8   |
|                    | Medium             | 24.3  | 41.9  | 14.4  | 11.66 | 15.6  | 21.6    |
|                    | Weight             | 22.7  | 7.8   | 0.7   | 0.3   | 0     | 6.3     |
|                    | Puso               | 0     | 0     | 0     | 0     | 0     | 0.0     |
|                    | Amount             | 704.8 | 353.4 | 78.4  | 204   | 152.8 | 298.7   |
| Pig                | Light              | 370.3 | 4     | 48.78 | 32.01 | 16    | 94.2    |
|                    | Medium             | 16.1  | 0     | 38.8  | 0     | 2.5   | 11.5    |
|                    | Weight             | 22.2  | 0     | 0     | 0.8   | 1     | 4.8     |
|                | Caseworm       | Brown planthopper | Armyworm       | Sheath Blight | Iron Toxicity |
|----------------|----------------|-------------------|----------------|--------------|---------------|
| Puso           | 0              | 0                 | 0              | 0            | 0             |
| Amount         | 408.6          | 4                 | 87.58          | 32.81        | 19.5          |
|                | 376.2          |                   | 376.2          |              | 110.5         |
| Light          | 618.1          |                   | 737.46         | 565.2        | 519.7         |
| Medium         | 43.97          |                   | 48.9           | 149.3        | 66.2          |
| Weight         | 0              |                   | 5              | 9.4          | 3             |
| Puso           | 0              |                   | 0              | 0            | 0             |
| Amount         | 662            |                   | 791.36         | 723.9        | 589.4         |
| Light          | 27             |                   | 97.21          | 208.1        | 103.1         |
| Medium         | 10.2           |                   | 0              | 32.4         | 11.3          |
| Weight         | 0              |                   | 0              | 4            | 1.3           |
| Puso           | 0              |                   | 0              | 0            | 0             |
| Amount         | 37.2           |                   | 97.21          | 244.5        | 115.7         |
| Light          | 22.1           |                   | 10.4           | 22.85        | 14.5          |
| Medium         | 17.4           |                   | 11.8           | 6            | 7.7           |
| Weight         | 0              |                   | 2              | 0            | 0             |
| Puso           | 0              |                   | 0              | 0            | 0             |
| Amount         | 39.5           |                   | 242.5          | 96.0         | 22.5          |
| Light          | 76.1           |                   | 102.3          | 25.3         | 68.0          |
| Medium         | 5.9            |                   | 6.8            | 32.6         | 9.1           |
| Weight         | 0              |                   | 0.1            | 0            | 0             |
| Puso           | 0              |                   | 0              | 0            | 0             |
| Amount         | 82             |                   | 109.2          | 57.9         | 77.1          |
| Light          | 7.55           |                   | 195.5          | 45.9         | 63.3          |
| Medium         | 0.5            |                   | 18             | 2.8          | 5.1           |
| Weight         | 0              |                   | 0              | 5.5          | 1.1           |
| Puso           | 0              |                   | 0              | 0            | 0             |
| Amount         | 8.05           |                   | 213.5          | 54.2         | 69.5          |

Source: Processed from data of UPT Perlindungan, Dinas Pertanian of Riau Province.

Farmers usually avoid bird pest by way of waiting for the rice fields to expel the birds directly who want to eat rice. Farmers also often use a lat help scarecrows and tin cans are placed to spread the planting area and connected by a rope and then pulled to cause noise. Another way is to close the rice yang yellowed and ready for harvest with fishing nets. This last way although quite effective but expensive to buy a net enough to cover a vast expanse of rice fields.

For rat pests, the average extent of the attacks during 2011-2015 is 790 ha/year. Every year, rodent pests also cause severe damage to rice crops, with an average annual weight of 25.1 ha per year. In addition, mice was recorded 3 times causing puso rice plants, namely in 2011 area of 3.8 ha, the year of 33.6 hectares in 2012, and 2015 of 1 ha, with an average of 7.7 ha per year.

In the past 10 years (1997-2006), rats have also caused the greatest damage to rice crops [28]. Among the 7 species of mice, the major pest species are *Rattus argentiventer* Rob and Kloss. The mice are capable of causing 50 - 100% damage. Some of the recommended rat control technologies include: (i) Environmental sanitation and habitat manipulation; (ii) technical culture, (iii) physical control, use of light, pumping water or mud into rat nests, ultrasonic sound, mass “gropyokan”,...
trapping, linear trap system, (iv) utilization natural enemies; (v) chemical control (rodenticide, fumigation, repelent, antifertility) [11, 12].

For the pests of the pest, the average area of attack is 912.1 ha/year. Every year within the period of 2011-2015, the pest of the pest is also always causing heavy damage to rice crops, with the average area of heavy attack per year reaches 10.6 ha. The pest of Walang is also recorded 3 times causing puso rice plants, namely in 2011 as wide as 25 hectares, in 2012 as wide as 5 ha, and in 2013 area of 2 ha.

According [13] that 5 witches (Leptocorisa oratorius F.) on every 9 clumps of plants can reduce yield by 15% and then 10 tails in 9 clumps of plants can reduce yield by 25%. Thus, the pest that causes puso and severe damage to rice plants in Riau Province is estimated to exceed 10 population/9 clumps of plants.

Among the pests belonging to disease (pathogens), brown spots are the most destructive type of rice crop diseases in Riau Province in 2011-2015. The average area attacked by brown spotting disease reached 143.5 ha/year. Every year brown patches also cause severe damage to rice crops, with an annual average of attack area is 10.2 ha. The brown spot disease was noted to have caused serious rice plant damage in 2011 with the area of damage 10 ha.

In Riau Province, some things that can be suspected as the cause of severe damage by brown patch disease in rice plants are many bad drained fields, high acidity so that nutrients are less available, and planting of vulnerable varieties. This is in accordance with the opinion of [14], that severe damage by brown patches is common in rice cultivation on land with poor drainage systems or nutrient-deficient soils, especially potassium elements. In addition, the extent of damage by brown patch disease is also influenced by the type of varieties grown and the level of attack [15].

The golden snail pest (snail) also belongs to the pest that harms rice crops in Riau Province, with an average attack area reaching 250.1 ha/year. Each year within the period of 2011-2015, the mangrove snail always causes severe damage to rice crops, with an average annual attack area reaching 8.0 ha. Mutation of mulberry recorded four times causing puso rice plants, namely in 2011, 2012, 2013, and 2014, with an average attack reached 1.9 ha.

According to [16], snails (Pomacea canaliculata Lamarck) can cause severe damage especially when the plants are young with the condition of the land rather stagnant. For that young plants are attacked should be immediately inserted and reduce puddles. Other recommended controls include: egg trap fitting, trap feeding such as taro leaves, duck grazing in affected areas, and chemical control [17].

Bacterial leaf blight (BLB) is the second most destructive type of pest after brown spot disease in rice plants in Riau Province. The average extent of BLB disease attacks reaches 212.5 ha/ year. In the period 2011 - 2015, HDB disease caused severe damage as much as 4 times, with the average area of heavy attack per year reached 8.8 ha. BLB disease recorded 1 time causing puso in rice plants, ie in 2014 of 2.5 ha.

BLB disease caused by Xanthomonas oryzae pv. oryzae can cause severe damage to dried up because this pathogen can infect rice leaves at all phases of plant growth, ranging from nursery until the harvest. Therefore, control is recommended in an integrated manner with the various ways to suppress the development of the disease, including the use of varietas resistant [18, 19], healthy seeds, chemical, and biological [18].

Blast disease is the most destructive type of pest number 3 after brown spots and HDB disease in rice plants in Riau Province. For blast disease, the average attack area reaches 323.1 ha/year. In the period of 2011 - 2015, blast disease always causes severe damage to rice crops, with an average annual attack area reaching 5.0 ha. Blast disease was recorded only 1 time to cause puso rice plants, namely in 2014 of 1.5 ha.

Blast disease caused by Pyricularia grisea fungus Cavara [27] often attacks upland rice in addition to wetland rice. As is known, that 13% of rice production in Riau Province is produced from upland rice so this is also suspected as the cause of high blast disease in Riau Province.
In addition, blast disease attacks are also influenced by the type of varieties grown. For that purpose, resistant varieties are the main components and the most effective, economical, and easy way to control blast disease [20]. A rice variety can be resistant to a type of blast even though its resistance can eventually be broken [21,22] For this reason it is recommended to use resistant varieties alternately and proper fertilization in order to anticipate rapid blast type changes [14].

For stemborer pests, the average extent of the attack reaches 680.5 ha/year. Each year within the period of 2011 - 2015, stem borer pests also always cause severe damage to rice crops, with an average annual attack area of 31.5 ha. The stem borer was recorded 2 times causing puso of rice plants, ie in 2012 and 2013, with average attack area reaching 0.3 ha.

In the field, the presence of stem borer (Scirpophaga spp.) is characterized by the presence of moths, the deaths of rice buds (sundeps), death of panicle, and larvae of stem borer. These pests can damage crops at all growing phases, both at the time of the nursery, the seedling phase, and the flowering phase. Until now there are no varieties that resist the stem borer. Stem borer prefers organically managed rice plants [23]. According to Baehaki et al. [24] The strategy for stem borer control is a powerful triangle implementation strategy, namely implementing properly stem borer control (applying the economic threshold is based on monitoring of population moths using light traps, four days after the first moth flight ), building community controls in the community, as well as support from central and local government policies and tehir commitments.

Of the 8 types of pests that can cause severe damage to rice plants, pest orong-orong is the type of pest that always causes severe damage each year during the period 2011-2015. The average area of orong-orong pest attacks with severe damage categories reached 7.3 ha / year. Other pests that cause severe damage are 6.3 ha of land cover, 4.8 ha of pigs, 3.6 ha of white pest, 1.3 ha of brown planthopper, 0.4 ha of grayak catpillar, an area of 0.1 ha, and Fe toxicity of 5.5 ha.

Mole cricket (Gryllotalpa orientalis Burmeister) often attack rice plants in tidal land. Orongs attack the root or base of growing rice plants and rice plants in irrigated rice fields, lebak, tides if there are no puddles. Mole cricket pests are usually controlled by farmers through soil processing and carbofuran insecticide use.

Similar to mole cricket, black bugs (Scotinophara spp.) often attack rice plants in lowland areas, such as in Riau Province [26]. Black bugs damage rice plant by sucking up the rice plant liquid so that the color of the plant turned reddish or yellow. The population is often abundant so control using pesticides often fails.

References

[1] Badan Pusat Statistik Provinsi Riau 2016 Provinsi Riau dalam Angka. http://www.riau.bps.go.id. [21 Agustus 2016].
[2] Badan Pusat Statistik Indonesia 2016 Pertanian dan pertambangan. Tanaman pangan. http://www.bps.go.id/linkTableDinamis/view/id. [20 Agustus 2016].
[3] Kementerian Pertanian 2015 Upaya khusus (Upsus) Swasembada Pangan 2015-2017. http://biogen.litbang.pertanian.go.id/index.php/2015/02/upaya-khusus-upsus-swasembada-pangan-2015-2017/. [20 Agustus 2016].
[4] Susanti E, Ramadhani F, Runtunuwu E, Amien I 2012 Dampak perubahan iklim terhadap serangan organisme pengganggu tanaman (OPT) serta strategi antisipasi dan adaptasi. Balai Penelitian Agroklimat dan Hidrologi. Bogor.
[5] [Dirjentan] Direktorat Jenderal Tanaman Pangan 2015 Keputusan Direktorat Jenderal Tanaman Pangan Nomor:55/HK.310/8/2015 tentang Petunjuk Teknis Pemantauan dan Pengamatan serta Pelaporan Organisme Pengganggu Tanaman dan Dampak Perubahan Iklim. Jakarta: Direktorat Jenderal Tanaman Pangan. Pp. 88.
[6] [DPTP] Dinas Pertanian Tanaman Pangan Provinsi Riau 2014 Laporan Gerakan Operasi Riau Makmur. Dinas Pertanian Tanaman Pangan Provinsi Riau. 176 hal.
[7] [DTPHP] Dinas Tanaman Pangan Hortikultura dan Perkebunan. 2017. Rumusan Hasil Rapat Evaluasi dan Rencana tahun 2017. Nomor surat 521.21/Dis-TPH Bun/325, tanggal 30 Januari 2017. 5 hal.

[8] Jurati, Ade FY, dan Dahlia 2015 Jenis-jenis burung (aves) di persawahan Desa Pasir Baru Kabupaten Rokan Hulu Riau. E-Journal Mahasiswa Prodi Biologi, FKIP Universitas Pasir Pangaraian 1 (1) 1-4.

[9] Sumari GD 2011 Identifikasi Burung Pemanah Biji pada Berbagai Kultivar Padi (Oryza sativa L.) di Desa Gentan Kecamatan Bendosari Kabupaten Sukoharjo. Skripsi Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Sebelas Maret Surakarta. Surakarta.

[10] Priyambodo S, Ziyadah K 2012 Kemampuan makan dan preferensi pakan pada bondol peking (Lonchura punctulata L.) dan bondol jawa (Lonchura leucogasteroides Horsfield & Moore). Prosiding Nasional Hasil Penelitian Padi 2011. Inovasi Teknologi Padi menganitispasi Cekaman Lingkungan Biotik dan Abiotik. Editor: I Putu Wardana, Sudir, N Usyati, Made J Mejaya. Balai Besar Penelitian Padi.

[11] Priyambodo S. 1995. Pengendalian Hama Tikus Terpadu. Penebar Swadaya. Jakarta.

[12] Sudarmaji, Herawati NA. 2009. Ekologi tikus sawah dan teknologi pengendaliannya. http://www.litbang.pertanian.go.id/special/padi/bbpadi_2009_itp_11.pdf,[4Sept 2015].

[13] Suharto H. Damardjati DS 1988 Pengaruh waktu serangan walang sangit terhadap hasil dan mutu hasil padi IR 36. Reflektor 1(2) 25-28.

[14] Syam M, Suparyono, Hermanto, Wuryandari DS 2007 Masalah Lapang Hama, Penyakit, Hara pada Tanaman Padi. Cetakan ketiga. Pusat Penelitian dan Pengembangan Tanaman Padi.

[15] Djunaidi A 2009 Ketahanan padi (Way Apo Buru, Sinta Nur, Ciherang, Singkil, dan IR64) terhadap serangan penyakit bercak oklat (Drechslera oryzae) dan produksinya. Agrovisor 2 (1) 8-15.

[16] Suharto H. Kurniawati N 2009 Keong mas dari hewan piarai menjadi hama utama padi sawah. http://www.litbang.pertanian.go.id/special/padi/bbpadi_2009_itp_14.pdf. [4 September 2016].

[17] Hamidy S. Khalid J. Hamdani MA 2007 Rakitan teknologi pengendalian keong mas. http://nad.litbang.pertanian.go.id/ind/images/dokumen/Rekomtek/07-RAKITAN%20TEKNOLOGI%20PENGENDALIAN%20HAMA.pdf. [4 September 2016].

[18] Kadir TS, Suryadi Y, Sudir, Machmud M 2014 Penyakit bakteri padi dan cara pengendaliannya.

[19] Herlina L, Silitonga TS. Seleksi lapang ketahanan beberapa varietas padi terhadap infeksi hawar daun bakteri strain IV dan VIII. Buletin Plasma Nutfah 117 (2) 80-87.

[20] Khaeruni A, Taufik M, Wijayanto T, Johan EA 2014 Perkembangan penyakit hawar daun bakteri pada tiga varietas padi sawah yang diiokulasi pada beberapa fase pertumbuhan. Jurnal Fitopatologi Indonesia 10 (4) 119-125.

[21] Corea-Victoria FJ, Zeigler RS 1993 Pathogenic variability in Pyricularia grisea at rice blast ‘hot spot’ breeding site in Eastern Colombia. Plant Disease 77 (10) 1029–1035.

[22] Sudir, Nasution A, Santoso, Nuryanto B 2014 Penyakit blas Pyricularia grisea pada tanaman padi dan strategi pengendaliannya. Iptek Tanaman Pangan 9 (2) 85 – 96.

[23] Hadi M, Soesilohadi RCH, Wagiman FX, Suhardjono YR 2015 Populasi penggerek batang padi pada ekosistem sawah organik & anorganik. Bioma 17 (2) 106–117.

[24] Baehaki SE 2013 Hama penggerek batang padi dan teknologi pengendalian. Iptek Tanaman Pangan 8 (1) 1 – 4.

[25] Paendong E, Palealu E. Rimbing J 2011 Penyebaran hama kepinginan tanah dan musuh alamnya pada pertanaman padi sawah di sulawesi utara. Eugenis 17 (3) 178 – 186.

[26] Sudarmaji 2007 Pengendalian hama tikus terpadu untuk mendukung P2BN (Peningkatan Produksi Beras Nasional). Direktorat Perlindungan Tanaman. Direktorat Jenderal Tanaman Pangan. Jakarta.

[27] Rossman AY, Howard RJ, Valent B. 1990. Pyricularia grisea, the correct name for the rice blast disease fungus. Mycologia 82(4) 509-512.