Major pests and diseases of maize and availability of control technology

Dian Rahmawati¹, Samrin¹, Baharudin² and Warda³

¹ Assessment Institute of Agriculture Technology Southeast Sulawesi

Email: dian.sp27@yahoo.com

Abstract. The maize one commodities Indonesia of food, apart from rice, soybean, wheat and sorghum has the potential to feed, needs raw materials industries and handicrafts. To the improving quality and maize through to improved cultivation, varieties superior new, pest and disease control, handling harvest and post harvest. This paper aims to know pest and disease of the maize and strategic control. The lot of genus Athergiona in Indonesia, Malaysia, Philippines, Srilangka, Pakistan, Pacific Islands and Australia. The pest caterpillar of Spodoptera litura also came from State Southern Europe, Africa, India, China, Asia, Indonesia, Australia, United States and other Pacific Countries until the United. The pest species A. oryzae, A. exigua, Oxya sp., S. litura, H. armigera, O. furnacalis, O. nubilalis, S. exempta and N. viridula attack plants of maize on form of imago and larva active on day and night. The larva and imago strike base the bones of leaves, hair on the tunny, shoots of panicles, male flowers and sucking the juices on cobs young. Pest attacks has caused perforated of leaves, slow growth, yellowing, epidermis leaves transparent, rot, cobs open and maize dead. The disease blight leaves on a maize caused of H. turcicum Pass., P. Sorghi Schwein., P. maydis, P. philippinensis, Fusarium sp., Diplodia sp. and bacteria Erwinia sp. Disease and bacteria attacking of leaves surface of the top and bottom leaves the whole leaves are yellow, dwarf plants, maize cobs foul part or all and fall. Symptoms attack look the epidermis burst and masses of spores free cause urediosorus, small patches, evolved into blight green grey or dark brown. Infectious disease occurring through stomata of maize leaves young. Overpopulation pest and disease attack on the highest for the climate change dry to rainfall, rainy season, factors wetlands due to flow of irrigation, because high air humidity as well as abundance of food. Pest control 70-90% using natural enemies Systoechus sp., M. anisopliae, Trichogramma. spp, E. annulata, B. thuringensis, H. armigera Nuclear Polyhedrosis Virus (HaNPV), birds, spiders, and chemical, carbofuran, decis, the active monocrotofos, triazofos, dikhlofos 2-3 g per plants. Biodiversity control disease blight leaves of maize using T. Viride and nordox 56wp chemistry. Culture pest and disease control technical of maize with land cultivation, varieties hold, multiple cropping of maize with peanut or soybean alternation of host plant, with not in in proper time, fertilizing balanced, avoid planting during rainy season, male cutting part of the interest, environmental sanitation and environmentally friendly organic agriculture.

1. Introduction
Maize are mostly rice, food after flow and eventually feed, as the needs of raw materials and handicrafts industry [1]. The demand for maize to feed have added value that is higher than soybean. The need for the availability of maize rises annually followed with an increase in the volume of production in Indonesia. Based on Statistical Data Directorate General of Food Crops Agriculture Ministry Indonesia, for three the last years 2014-2016 is going on increased production of maize from 19.008.426 tons to
23,578,413 tons. Even production of maize Indonesia in 2017, able to press the import value to zero percent, and the year 2018 have export 372,000 tons. It is one of the efforts of government programs work and accomplish self-sufficient food through a special effort to development of rice, maize and soybean.

In an effort to improve the quality and productivity maize techniques cultivation, management, care, handling organisms a bully plants and handling harvesting and after harvest is getting into the main concern. The development of a major pest and disease it has long attacked of maize cultivated by farmers. Some are major pests and diseases attack that maize such as flies seeds (Atherigona exigua), locust (Oxya spp), caterpillar (Spodoptera litura), caterpillar tunny (Helicoverpa armigera), maize borers (Ostrinia furnacalis), and Nezara viridula [2, 3]. A disease affecting the maize which is a blight of leaves (Helminthosporium turcicum Pass), rust (Puccinia sorghi Schwein), blight (Peronosclerospora maydis), rotten disease stems and rotten cob (Fusarium sp) [2].

To address the problem of pest and disease that attack maize should be the main concern with regard to the symptoms of an attack to control to be made. Pest and disease primary control attacks of maize crop and continue to undergo development in line with developments in technological progress. Control strategy in reducing the development of the population of pests and diseases the maize is done either biologically, the culture of engineering and the use of insecticides and fungicides. The paper is aimed at ascertaining of pest and major diseases that strike at several centers production of maize in Indonesia. This paper aims to know pest and disease of the maize and strategic control.

2. Major Pests and Diseases in Maize Production

| No. | Attact     | Vegetative Phase                          | Generative phase      |
|-----|------------|-------------------------------------------|-----------------------|
| 1   | Pest       | Seedling flies of Aterigina sp             | Spodoptera litura     |
|     |            | Oxya spp., Spodoptera litura              | Helicoverpa armigera  |
|     |            | Ostrinia furnacalis                       | Nezara viridula       |
| 2   | Disease    | Bottle disease of P. maydis               | Fusarium sp           |
|     |            | Peronosclerospora maydis                  |                       |
|     |            | Helminthosporium turcicum                |                       |

2.1 Pests major attack of maize:

a. Seedling flies of Atherigona exigua

The genus Atherigona is a lot of be found in almost every region of Indonesia, Malaysia, Philippines, Srilangka, Pakistan, Islands of Pacific and Australia. There are two species stimulate outbreak severe of pest which can strike of maize plant and upland rice is the forms A. oryzae and A. exigua. This flies of seedlings can also afflict type of the grass to grow as Cynodon dactylon, Panicum repens and Paspalum sp. [5,6]. Flies seedlings like of maize plant young at age of 6-9 days after planting they put to eggs [7]. The climate condition who preferred to an activity attack of seedling flies are very high was in the rainy season at the age of maize plant 1-2 months.

Pest imago A. oryzae and A. exigua measuring 3-3.5 mm, gray and active in the afternoon the clock at 16.00-18.00. The pest imago females able to lay eggs as much as 18 grain on one the surface maize plant of leaves. The eggs pest is generally laid on after of maize plant grow to age two weeks [8]. In stadia young larvae was 40 to 48 hours very active and moving to the base of stem, next went to into growing point among the midrib leaves and maize plant of stems. The larva of pest this maize attack on the trunk of a leaves with shaped like a leaves potholes, growth of late, yellowing, the network of rot or symptoms sundep.

Although many eggs placed on single crop, only one larva development and often sometimes one larvae can affect more than a plant. The development of larva needing high humidity. Hence, this pest does not attack during the dry season. In general the pupa is formed in pest land adjacent to plant but
sometimes in the tissues of plants. Stadia live a pupa of the tariffs range from 5-11 held after day with average 8 days. Stadia live the development of blight from the poisonous east this is from eggs to become a pest grown to maturity and become to happen so long as 26 day. Flies seeds attack plants young plant on the resulting in the dead plants. Attack symptoms seen in when of maize plant leaves change color from green normal to be brass. Then around stalks of maize by decaying until, withered plants small and even death [7].

b. The Pest Oxya spp.

Pest species Oxya spp. is pretty important pest on some food crops. It has a range of pest host, enough as of maize plant, nuts, rice, cotton and wheat [9]. The imago Oxya sp. males or the two females. Laid an egg in a gregarious manner and covered with the substance that resembling lather. The eggs, which are laid in the ground or tissues of plants rice and maize. The eggs Oxya sp. brown yellow cylindrical resembling grains of rice. The one egg groups the average contains nine points and generally eggs hatch in the morning for four weeks after on laying [9]. It consists of five nymph pest instar each may be distinguished from the size and color. The pest of imago generally 18-27 mm, sized males while of imago females between 24-43,5 mm. Imago green yellow or yellowish brown seen looked shiny. The imago males had a couple bright stripes in the head and the dorsal portion while in the imago female has a dark through the eye until the base of the wings [10].

The attack inflicted pests are tear in leaves and a heavy attack skeletal leaves it just. Locusts are many pest main destructive of plant. The pest attacks is caused by the corresponding especially around land lots overgrown with weeds and various kinds the main host of plant [11]. Some natural enemies from pests it is like parasited and predators had been reported can control the population Oxya sp. The natural enemy whose larvae are Systoechus sp. (Diptera: Bombyliidae). In addition, birds and spiders can be lowered population Oxya sp. [10]. Natural enemies Oxya sp. among Metarhizium anisopliae insects are pathogenic. The research results show that pathogenic is used as biopestisida being able to control 70-90% of locusts when their wings over the span of the 14-20 day [12].

c. Caterpillar Pest of Spodoptera litura

The spread caterpillar of Spodoptera litura attack from southern Europe, Africa, India, China, Indonesia, Australia, and other pacific countries until the united. Caterpillar this was found in Java to at an altitude 1800 m from sea level [6]. Blasting the population caterpillar of S. litura is usually can suddenly appeared and also slipping away. Attack on the leaves maize caterpillar of S. litura regarding a bare heights and dead, especially in times of high population. The population explosion caterpillar of S. litura only occurring during one generation, followed by drop in the next generation population. The population explosion of pest caused by dry climate change especially period followed rainfall, high humidity and accompanied by an abundance of food population explosion it is because of ways condition of being less favorable after they development are parasitic and troop of predators.

The caterpillar of imago this laid an egg in a gregarious manner on the leaves and covered with feathers colored light brown. The female of Spodoptera sp. can spawn to 1500 grains, and each group as many as 50-400 grains andstadium eggs held 3-5 days. Caterpillar of S. litura is have capability laid an egg high followed by the female cannibalism in between the larva. Cannibalism it is an expression of compensation for the levels of education show decreasing the qualities of meal which are in themselves an important factor in the dynamics percent of population [13].

Pest on young larvae, usually stay on the laying an egg and attack in groups. By day larvae hide in the ground and actively attacking at night, except of S. exempta are also actively by day. Pattern of coloration the larva differing depends on his behavior. Is exposed to basal condition of jostled (crowded) him over gregarious, dark colored larvae active, while in the case of solitary made its mate of lighter colored and passive. Larvae can reach long (4-4,5 cm) and stadium larvae 13-18 day. The pupa is formed in the ground with on stadium about nine days. The development the egg until it adults of Spodoptera sp. during 29-31 days. An adult insect life short and can marry several times and continue to lay the eggs during 2-6 day.
Outbreak of severe pest attacks is composed essentially of hydrous of young plant can be inhibiting the growth of even could lead to the death of plant. The heavy attack on young plant can result in the leaves alone but bones [4]. The caterpillar of Spodoptera sp. attack plants young at foliar part. The larvae who was a kid ruin leaves and attacked simultaneously. The attacks on plant debrisleaves left the upper part of the epidermis transparent and living the leaves [14]. The pest can be by use an insecticide of carbofuran 3% that is sprayed on the part the shoots of plants.

d. Caterpillar maize cobs borers of Helicoverpa armigera

Insects Helicoverpa armigera attack maize plants at the age of 45-56 days after planting and simultaneously with the emergence of hair on the cobs. This vermin laid an egg in single file on the hair of maize cobs and hatched 4 days after planting. The caterpillar of these pests becoming of pupa in the cob or on the ground. Moth active during the night and capable of spawning 600 to 1000 eggs and pupa stadia ranged from 12-14 day. Besides attacking the tunny also attacked is starting and attacked panicles so that male flowers are not formed and resulting in results of reduced. The life cycle insects of H. Armigera during 36-45 days [9]. The immature of insects green tanned, pale to medium-sized moth, very destructive to plant of maize and after the winter changed into the pupa in land.

On the control of H. armigera may be done by means and useful for increasing, the culture of technical process, and chemically. Control biodiversity can use parasitoid of Trichogramma spp. which is parasitic of eggs and E. argentipilosa (ichneumonidae) parasitic on larvae, young the fungus infects the larvae, A. metarhizium, a bacterium Bacillus thuringensis and Helicoverpa armigera Nuclear Polyhedrosis Virus (HaNPV) infect the larvae. The control technical culture better of soil management can ruin the pupa is formed in the ground and can reduce in next population of H. armigera. The chemical control by spraying insecticides of decis done after the establishment hair of maize on the cobs and passed maize 1-2 days until dark brown hair [15]. The chemical stunning piece of control its can be done by apply an insecticide of carbofuran 3% at the time of in the lead up to blossom like the rose and on the control can find similar or even 3 the tunny broken 50 per plant at the time of newly formed the fruit [4]. The caterpillar of cobs is very problematic on several varieties especially on sweet maize. The control to be carried on when hatching eggs, monitor laying eggs and larvae young natural and an enemy died from chemicals. The use of B. thuringiensis or entrust SC can be applied to control insects in plants organic environmentally friendly.

e. The maize borers of Ostrinia furnacalis

The borers of maize (Ostrinia furnacalis, Pyralidae: Lepidoptera). The O. furnacalis guenee stimuate outbreak of severe pest is a subsidiary to us the main upon maize in Asia and the country the West Pacific. In Indonesia, this species long considered O.nubilalis (Pyrausta) with corelation, one species of which are plenty in Europe and America. Lose a bit of their series of poor results caused by stimulate outbreak of severe pest stalk borer O. furnacalis can reach up to 80%, in fact it is not uncommon for were also reported a complete corruption.

In general the grilled subsistence of males or the two females of O. furnacalis can be laid an egg such as 300-500 grain on the bones of leaves the lower part three of leaves top the boar. The pest forth from the egg to caterpillar which male flowers and spreads through the intermediary wind. The pest caterpillar was immediately drill leaves open, then towards stems and such as drillrods and establishing the hall and pointing upward. After reaching the book top leaves of maize by caterpillar right down to book of the bottom. The pest of caterpillar form pupa in stems with the life cycle 22-45 days. The form of an attack on the plant stem of maize usually broken and then dead plants because stop page the unsure translocation of roots on plants into the leaf [9].

In the field, an adult insect started laying eggs on the maize plant at the age of two weeks. The top of the lay eggs occurring in panicles stadia the formation of the maize plant went out the male flowers [16]. The eggs laid in groups on the undersurface of leaves near the leaves of maize especially on the young leaves such us 3 leaves top with stadia eggs during 4-5 days (4, 12 days). The instar stimulate outbreak of severe pest first and they just started disperse after they pass across after they pop out to other parts on the maize plant. On the formation of maize plant, panicles of stadia the larvae instar, first to third can
attack young leaves are still roll and on surface of leaf that is sheltered from the leaves that have opened. The larvae in instar third toes partially are generally situated on the male flowers, even though we already is actually and other plant of maize. Fourth and sixth instar gimlet started on the books and enter stem plant of maize. The larvae enter into stem and gimlet to the top the stem of maize plant. In one a hole can be found more than one larva with long stadium the larva during of 18-27 days. The larvae that have shaped the pupa make a hole out to be closed with the layer of epidermis. The pupa is formed in the trunks with long stadium during to 5-10 days. Immature insects can surface at night hours 20.00-22.00 to marriage and lay eggs on the same night the week directly hatched. In stadia butterfly is not interested in bright light and flying as far as 300-400 m. Also found in stadia larvae can strike at the sorghum Coix, Panicum viride, Amaranthus and various kinds of other plants when of maize plant finished harvested.

The control of O. furnacalis technical culture can be carried out, biological and chemical. In the culture of technical control by doing with multilpeecropping of maize with soybeansor peanuts cutting some of the male flower 4-6 rows of crops and for which appropriate. The biodiversity control with use of natural enemies to parasitoid Trichogramma spp., predators of Euborellia annulata prey on the larva and pupa of O. furnacalis, the bacterium Bacillus thuringiensis Kurstaki control on the larva O. furnacalis, boletus as entomology and patogenic with metarhizium of Beauveria bassiana and anisioalae to control of the larva O. furnacalis can use agents biodiversity nuclear polyhedrosis virus (NPV) which can increase mortality insect of the pests [17]. The chemical control made using an insecticide active monokrotofos, triazofos, diklhrofos, karbofuran because and effective in reducing attack stalk borer of maize [15]. In addition the control use an insecticide of carbofuran 3% in the plant as many as 2-3 g per plants.

The pest of maize Nezara viridula
The pest of Nezara viridula are insects who polyphagous, cosmopolitan pest and that is important to plant maize. This vermin strike with sucking the juices on cobs young plant of maize. Symptoms of pest attacks is marked with leaves roll up on the skin of the tunny results in the end of the tunny open [3].

2.2 Diseases major plant of maize:

a. Disease blight leaves of Helminthosporium turcicum Pass
Blight leaves on a maize plant disease caused by Helminthosporium turcicum Pass. Pathogens it attacks a foliar part of maize plant with symptoms seen small patches oval-shaped evolved to blight green grey or reddish-brown, with long blight 2.5-15 cm. Spotting a blight of leaves was first found in the lower part of old leaves evolved toward young leaves at the top. This leaves attack symptoms patches wide on the red leaves midrib grey or brown and looks these droplets of in which sclerotia are the that can be turns brown that attaches to the surface of leaf or the midrib infected. Disease blight leaves maize in general and high attack on the rainy season. For disease control blight leaves of maize can use the fungus of Trichoderma viride antagonistic [18].

Symptoms attack disease with patches of leaves this globular elongated then continue to grow into patches broad shaped tapering on the leaves. The attack disease blight of leaves reached 100% when the plant was 3 weeks after cropping and in general spread on the bottom leaves of maize plant [2]. Blight leaves disease caused by fungi Helminthosporium turcicum pass of the patches were visible, elongated rounded leaves wet, small oval and dark grey on fronds in early stadium. Spotting leaves disease it is the first appeared on leaves the bottom and spread extends in continuously and increased according to the development of maize crop [19]. Until now had been discovered some way control disease of blight leaves effective on the maize plant through the use of varieties resistant, environmental sanitation, good land management, setting the cropping and weeding perfect can be depressing or diminishing the inokulum early and fungicide as an alternative to the last [12].

b. Rust disease leaves on the maize plant by Puccinia sorghi Schwein
Leaves these rust disease caused by Puccinia sorghi Schwein and more were found in mountainous area of temperate tropics and temperate. Rust disease leaves begin to appear at the age of maize plant
four weeks after the sow in the ground with light intensity. The attack symptoms rust disease these leaves are reddish brown scattered on the surface of leaves. The high population of rust disease leaves usually to be supported by factor of wetlands to the passage of irrigation, damp and temperature inclined. The diseases are not only having a host on the maize plant, was also the host genus on grass [20].

The attack of disease symptoms can be seen from the upper surface under leaves and small round until there are patches oval, brown to red orange, because it formed boletus urediosorus length or long bulbous on the leaves. Symptoms show on the part the epidermis broke and masses of spores are released causing urediosorus brown or dark brown, rediosorus cook it can turn black if teliospora formed [21]. The diseases of *P. sorghi* have uredospora, brown color a rounded shape until elip, with the size of 21-30 x 24-33 μm. Thick wall spore of diseases this 1.5-2 μm. Thick wall spore of diseases this 1.5-2 μm every cell this disease has two core. Teliospora who replaced uredospora in rustul brown golden, smooth, globarul until elip, two cells, size 14-25 x 28-46 μm [22].

Biology disease of *P. sorghi*, teliospora germinate form basidia that produces small basiodiospora, thin-walled, hyaline and haploid. Basidiospores germinate and spread penetration on the leaves of *Oxalis spp*. Form spermagonia with spermatia small in the upper leaf surface plant of maize. Spermatia hold fusion with hipa pliable to enter stadia aecia in the under surface leaves and *Oxalis spp.* and then formed aeciospora. Two aeciospora nucleated and easily scattered by the wind to the ground and infect leaves of maize. On the leaves maize uredospora can be formed [23]. Biology disease Well-developed of *P. sorghi* 16-23°C in temperature and humidity high air. The diseases are able to defend themselves on the maize plant that lives and spread through the wind and infect other plant of maize [21]. On the plant of maize, it is fair to have been known form uredium and telium on *Euclaenamexicana, Tripsacum sp.* and *Erianthus sp.* [23]. It can not live as lord, so they could not with stand the rest plant of maize. Is not proved that boletus this terms of survival in the seeds of that is produced on plant have been sick for more. Is not proved that boletus this terms of survival in the seeds of that is produced on a plant have been sick for more [21]. Leaf rust disease control is possible from growing, resistant varieties keep environmental sanitation on the maize plant sweet and application of pesticides when it was starting to ulcers rust on the leaves.

c. Bligh disease of *Peronosclespora maydis*

In Indonesia currently boletus 2 type that can cause disease or bulai blight caused by *Peronosclespora maydis* and *Peronosclespora philippinensis* [24]. All a symptom of this attack of illness on the maize plant of this grenade is similar vary depending on cultivars of although it can be age and climate. This disease caused by a fungus *P. philippinensis* (Weston C.G). That shows symptoms in the form of line chlorosis or all of leaves are yellow and sunny deciduous dwarf plants [25].

This disease has emerged since the two weeks after planting of maize resulting in leaves experienced and impeded from chlorosis. In plants that older its leaves show spots, mottled sclorotic and wound on white-striped of leaves. Usually more narrow leaves and erect compared with healthy of plants and covered with white, growing downy on both the surface. If maize crop infected early can cause dwarf plants, unfruitful, but when cobs of maize not normal and it could also be causing the plant dead. The disease can be spread through the air and seeds it has some of the host come up with an alternative.

Disease blight presented a spread not much, but it continues to rise in any plant with as time the growth of plants. This disease is growing systemic, so that if, growing reach a point and all young leaves experienced sclorotic, came up later and leaves first to fourth were still some green. This is the characteristics of infection disease through the air but if kernels of maize are already infected so green seeds showed symptoms sclorotic on entire of leaves, so that the quickly die [23]. If the disease in the leaves of infected first could not get to the growing, only a symptom of leaves concerned as lines sclorotic, or as the early symptoms [21]. On the under surface the leaves of which are infected, a lot of formed a fine white flour degenerative brain malady that is the spores pathogenic.

The diseases two types of hyphae forming within the network leaves like hyphae less branched and much branched, hyphae and in groups or two types of hyphae forming disease in leaf tissue as hyphae less branched and much-branched, hyphae and the groups. Disease easily form haustoria in the cells host to absorb of foods. Disease can survive as the mycelium in embryos whose seeds are infected. If
this seed planted, a disease that participated in developing and infect the planting of seed. The next, disease can develop into a source of inoculum disease. Infection was transmitted through stomata leaves young of maize. The disease is growing local or systemic through sporangia and sporangiospora from the leaves wet in the darkness and sporangia serve as inoculum secondary. The management plant of maize that has afflicted can use, resistant varieties extermination plant, infected prevention by using active metalactsil, fungicide the time devoted to, unison and the alternation of plants or plant instead of host plant with rotation. Moreover using fungicides systemic to protect of seeds and plants in a spray on the leaves. In addition to be planted of seeds given treatment first by the use active of metalacsil or fungicide Nordox 56 WP and plants at the age of 5 days after growing until there is no longer gutasi in plant and use as a local west Kalimantan, resistant varieties Lagaligo, Bisi-4 and pioneer [5].

d. Disease foul stem and tunny of Fusarium sp

The cause of this disease apart from being caused boletus of Fusarium sp. also due boletus of Diplodia sp. and bacteria Erwinia sp. Are at the base of the stalks of maize foul so the top, withered and dry if there on cobs, maize cobs have become putrid partially or wholly. For disease control using varieties hold, fertilization balanced, avoid planting in the rainy season, and use fungicide chemical [18].

3. Conclusions and Recommendations

Indonesia as developing countries need to the improving quality and maize through improvements cultivation, new varieties superior, pest and disease control. The pest species A. oryzae, A. exigua, Oxya sp., S. litura, H. armigera, O. furnacalis, O. nubialis, S. exempta and N. viridula attack plants of maize on form of imago and larva, active on day and night. The larva and imago strike base the bones of leaves, hair on the tunny, shoots of panicles, male flowers and sucking the juices on cobs young. Pest attacks has caused perforated of leaves, slow growth, yellowing, epidermis leaves transparent, rot, cobs open and maize dead. The disease blight leaves on a maize plant caused of H. turcicum Pass., P. Sorghi schwein., P. maydis, P. philippinensis, Fusarium sp., Diplodia sp. and bacteria Erwinia sp. Disease and bacteria attacking of leaves surface of the top and bottom leaves the whole leaves are yellow, dwarf plants, maize cobs foul part or all and fall. Symptoms attack look the epidermis burst and masses of spores free cause urediosorus, small patches, evolved into blight green grey or dark brown. Infectious disease occurring through stomata of maize leaves young. Over population pest and disease attack on the highest for the climate change dry to rainfall, rainy season, factors wetlands due to flow of irrigation, because high air humidity as well as abundance of food. Pest control 70-90% using natural enemies Systoechus sp., M. anisopiidae, Trichogramma. spp, E. annulata, B. thuringensis, H. armigera Nuclear Polypedrosis Virus (HaNPV), virus birds, spiders and chemical of carbofuran, decis, the materials active monokrotofos, triazofos, diklhrofos. Biodiversity control disease blight leaves of maize using T. viride and chemistry of Nordox 56 WP. Culture technique of pest and disease control of maize with land cultivation, varieties hold, multiple cropping of maize with peanut or soybean alternation of host plant, with not in proper time, fertilizing balanced, avoid planting during rainy season, male cutting part of the interest, environmental sanitation and environmentally friendly organic agriculture.

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