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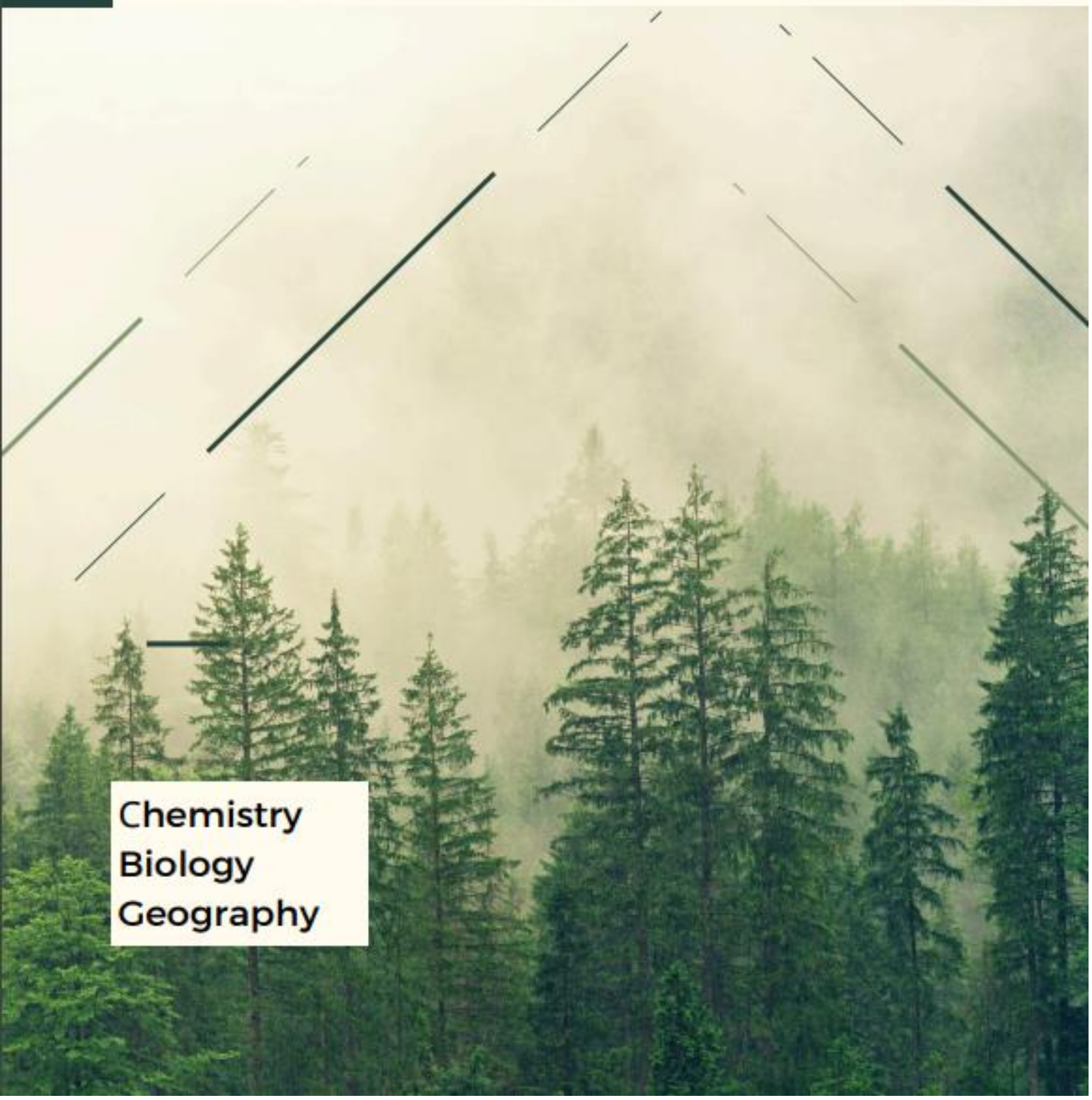

Chemistry
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CULTURAL FLAX (LINUM USITATISSIMUM) PESTS AND CONTROL MEASURES

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Annotatsiya: ushbu maqolada madaniy zig’ir (L.usitatissimum) o’simligining zararkunandalari va ularga qarshi kurash choralari haqida ma’lumot berilgan.

Kalit so’zlar: barg, ildiz, tuxum, lichinka, nimfa, g’umbak, insektitsid, piretiroid, akaritsid, almashlab ekish, yirtqich hasharotlar.

Аннотация: В данной статье представлена информация о вредителях культурного льна (L. usitatissimum) и мерах борьбы с ними.

Ключевые слова: листья, корни, яйца, личинки, нимфы, куколки, инсектициды, пиретроиды, акарициды, севооборот, хищные насекомые.

Annotation: This article provides information on the pests of cultural flax (L. usitatissimum) and the control measures against them.

Keywords: leaves, roots, eggs, larvae, nymph, pupa, insecticide, pyrethroid, acaricide, crop rotation, predatory insects.

Cultural flax is an important agricultural crop, but it is susceptible to various pests that can significantly impact yield and quality. Here are some of the main pests affecting cultural flax and the corresponding control measures:

The flax beetles (Aphthona flava) feed on the leaves of plants, reducing their ability to photosynthesize and consequently decreasing yield.

Appearance: These beetles are small, measuring 3-4 mm, and can be yellow-brown in color. They often have a shiny surface.

Life Cycle: Aphthona flava goes through stages of egg, larva, pupa, and adult beetle. They can produce several generations in a single season, which causes

damage in flax (rape) fields. The adult beetles lay their eggs near the roots of the zig’ir plant. Once the larvae hatch, they attack the roots.

Adult beetles mainly damage the leaves by creating holes, leading to leaf wilting and drying out. This disrupts the plant's photosynthesis process. The larvae live in the soil and damage the roots. Damage to the roots weakens the plant, reducing yield. As a result of the harm caused by Aphthona flava, plant growth slows, flowering is delayed, and seed production decreases, leading to lower productivity.

Signs: The appearance of holes in the leaves and slow plant growth are indicative. Adult beetles chew through both the upper and lower layers of leaves, causing them to dry out. When the larvae damage the roots, the plant grows slowly, and the leaves may wilt and dry up.

Control Measures: A biological method involves attracting natural enemies of the pests to the gardening environment. In biological control against flax beetles, their natural enemies, such as parasitic wasps, are commonly used. These predators help control the population of Aphthona flava. A natural environment can be created using preparations that improve soil microflora or through the introduction of insects that do not harm flax plants.

Chemical Methods: Insecticides, such as pyrethroids or organophosphates, can be used if the population of Aphthona flava increases. Pyrethroids and organophosphates are widely used. However, it is important to maintain appropriate dosages when using chemical preparations to protect the plants. The soil can also be disinfected with special agents against pests.

Agrotechnical Methods: Crop rotation helps reduce the population of Aphthona flava. Avoiding consecutive planting of flax in the same location and alternating it with other crops prevents the accumulation of pests in the soil. Deep tillage or soil treatment in the fall can destroy the eggs laid by the beetles in the soil.

While controlling Aphthona flava is crucial, ecological methods should be preferred to avoid harming the soil and plant environment. It is recommended to combine biological methods and agrotechnical measures for a more sustainable control strategy.

The flax Spider Mite (Tetranychus urticae)

The flax spider mite (Tetranychus urticae) resides on the underside of leaves and feeds on plant sap. This leads to yellowing and drying of the leaves. Although small and not easily visible, they can cause significant damage when present in large numbers.

They are very small, measuring approximately 0.4-0.6 mm. They are often yellow-brown, red, or green, and usually have two black spots on their bodies (figure 1). Tetranychus urticae goes through several stages from egg to adulthood: egg, larva, nymph, and adult mite. In warm climatic conditions, they reproduce very quickly, completing each stage in just a few days. Each female spider mite can lay 10-20 eggs per day. The reproductive cycle of each generation can vary from about a week to several weeks, depending on the climate.

Spider Mite (Tetranychus urticae)

The optimal conditions for the development of spider mites are air temperatures between 26–33°C and relative humidity of 55–60%.The mites can withstand very cold temperatures; in moist areas, when the temperature drops to –15 to –20°C, only 1–2 individuals may survive, while at –29°C, all will perish.

Signs: Signs of spider mite damage include small yellow or white spots on leaves and the presence of spider webs. Small white or yellow dots appear on the leaves, which start to dry out and lose color. When heavily infested, the entire plant may appear dry and could die. Tetranychus urticae creates fine spider webs on the undersides of leaves, which is a clear indication of infestation.

Tetranychus urticae feeds on plant sap, disrupting the cellular structure of the leaves. This slows down the plant's photosynthesis process and negatively affects its growth. Damage to leaves in flax and other crops leads to reduced yield, especially during the flowering and seed-setting periods.

Figure 1. Tetranychus urticae

Figure 2. The process of studying the harmful organisms of the cultural flax

Control Measures. Biological Methods: Utilizing predatory insects, such as spider mite predators (Phytoseiulus persimilis), can be effective. Natural enemies like Phytoseiulus persimilis serve as an effective means against Tetranychus urticae by preying on the mites and controlling their population. Entomopathogenic fungi,

such as Beauveria bassiana or Metarhizium anisopliae, can also be used as biological insecticides against plant diseases.

Chemical Methods: Acaricides specifically designed for Tetranychus urticae can be employed. These are lethal chemical preparations for mites. However, their use is recommended only in cases of severe infestation when other methods prove ineffective. A new chemical preparation, Akramayt 48% (biofenazate), has shown high efficacy against spider mite eggs and larvae. This acaricide has been proven to have minimal impact on beneficial predatory mites (Typhlodromips swirskii Athias) commonly used in biological control.

Experiments have been conducted to determine the biological effectiveness of acaricides against spider mites (fugure 2). Analysis of scientific research revealed that a new acaricide (spirodiclofen) has a strong impact on the eggs and larvae of Tetranychus urticae, achieving high effectiveness compared to traditional chemical preparations (milbemectin, bifenthrin, propargite, cyflumetofen, cenopyrafen, pyflubumid).

Some insecticides can be lethal to mites, but they cannot be used regularly as they may kill beneficial insects. Natural soaps or oils can wash off spider mites from plant leaves, providing a chemical-free ecological method that does not harm the plants. Maintaining soil moisture through irrigation systems and mulching can help prevent the increase of spider mite populations.

Tetranychus urticae reproduces very quickly in dry and warm conditions. Therefore, it is essential to implement additional protective measures for plants during dry seasons. Overusing pesticides can have harmful effects in the fight against Tetranychus urticae, as they may also kill natural predators, allowing the spider mite population to rebound more rapidly. Tetranychus urticae not only damages plants but can also spread viral diseases, potentially leading to plant death. Thus, timely detection and eradication are crucial.

Combining sustainable, environmentally friendly, and biological methods in the fight against Tetranychus urticae allows for the protection of plants while reducing reliance on harmful pesticides.

Cotton Bollworm (Helicoverpa armigera)

The cotton bollworm (Helicoverpa armigera) is considered a harmful pest for many agricultural crops. It attacks plants such as cotton, tomatoes, corn, zig’ir (rape), and beans, significantly reducing yield. The larvae of this moth damage the stems and leaves of plants, potentially leading to the direct loss of seeds and crops. Adult Helicoverpa armigera is in the form of a moth with wings that are light yellow or brown. The wingspan of the moth is approximately 30-40 mm. During the larval stage, it is a green, brown, or yellow caterpillar measuring 30-40 mm in length, with distinct stripes on its body. It goes through the stages of egg, larva, pupa, and adult moth. The eggs are typically laid on the flowers or young leaves of plants, and once the larvae hatch, they feed directly on the plant.

Helicoverpa armigera larvae damage the leaves, flowers, fruit, and seeds of plants. As they grow, they create larger holes and consume the internal parts, hindering crop production. As the caterpillars mature, they move down from the upper parts of the plants to the lower parts. Fully grown caterpillars burrow 5-15 cm into the soil in the field where they fed or nearby to pupate. Before pupating, they create a sturdy-walled chamber in the soil and wrap it with silk threads. When temperatures are above 15°C, moths emerge from the pupae after 11-15 days; if temperatures are lower, the pupae overwinter. The complete development of the cotton bollworm is largely temperature-dependent. At an average monthly temperature of 20°C, the development of the caterpillars takes about 43-44 days, while at 30°C, it takes about 30 days.

Signs: Large holes appear on the stems and leaves. Infected plants show damaged buds and flowers that dry out. Eggs are laid on the flowers and buds of plants, which is one of the initial signs of infestation.

Control Measures. Biological Methods: The use of Bacillus thuringiensis bacteria or natural enemies that attack the moth can be effective. Natural enemies such as parasitic wasps like Trichogramma or predatory insects can provide good results in biological control against Helicoverpa armigera. These insects eliminate the eggs or larvae, reducing the pest population.

Chemical Methods: Insecticides that prevent larval development can be applied. If the pest population is high, specific insecticides are used. Chemicals such as pyrethroids, organophosphates, or neonicotinoids are commonly employed. When the moths lay eggs, chemicals that target the eggs can be used.

Helicoverpa armigera develops rapidly in hot and dry climates. Therefore, during the summer months, the pest population can increase significantly. The damage caused by Helicoverpa armigera can lead to a reduction in yield of 50% or more. For effective control of this pest, it is recommended to combine biological, agrotechnical, and chemical methods.

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