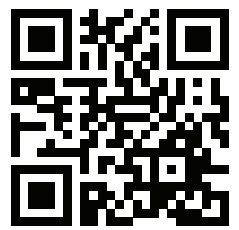


BIOTECHNICAL CONTROL WITH PEST INSECTS

Pheromone traps are used in mass catch and diversion techniques to determine the time of control.



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**ORGANIC AGRICULTURE
INDUSTRY TRADE LTD. COMPANY**



ORGANIC AGRICULTURE INDUSTRY TRADE LTD. COMPANY

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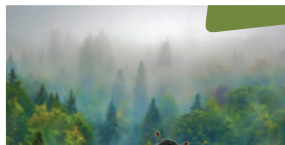
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“DO NOT USE POISON CHEMICALS, DO NOT POLLUTE THE ENVIRONMENT, DO NOT DESTROY YOUR HEALTH” WITH THIS SLOGAN, WE AS “KAPAR COMPANY” AIM TO MAKE POSITIVE CONTRIBUTIONS TO SOCIETY AND THE ENVIRONMENT.



Kapar Organic Agriculture Industry Trade Ltd. Company

Kapar Organic, that founded by Dr. Tuncer ÇEVİK on October 23-2000, started to work by producing pheromones and traps that are not produced in Turkey. Our company has made a great contribution to Organic Agriculture, Good Agriculture and Biotechnical Control. We continue our R&D and product development studies, alongside our production activities. With this purpose;

1. Our project named “**Development of Insect Catching Glue**” received R&D support by KOSGEB Presidency, Ankara University Technology Development Center Directorate. The project started on 25.02.2003 and was successfully completed on 31.01.2006.

2. “**Local Production of Pheromone Traps Used in Biotechnical Control of Forest and Fruit Pests**” By KOSGEB Ankara Service Center

Directorate was provided support within the scope of R&D, Innovation and Industrial Application Support Program. Our project was successfully completed on 03.03.2014.

3. Our project named “**Research and Local Production of Pheromone Traps Used in the Control of Forest Bark Beetles (Ips spp.)**” supported by TUBITAK was successfully completed on 28.02.2009.

Our Main Patents and Permits (Licenses)

1. Insect Catching Glue Patent (TR200001372 B), 15.05.2005

2. Many License Certificates given by the Ministry of Food, Agriculture and Livestock of the Republic of Turkey.

Our Main Document, Plaque and Awards

1. Platinum apple R&D award given by Isparta governorship on 06.12.2013 for our contribution to apple cultivation.

2. “**TECHNOLOGICAL PRODUCT EXPERIENCE CERTIFICATE**” given by Minister of Science, Industry and Technology Mr. Fikri Işık

3. TMMOB Chamber of Agricultural Engineers 2015 Service Award.

Types of Using Pheromone and Color Traps in Biotechnical Control

Agricultural Engineer MSc
Caner ÇEVİK

ABSTRACT

Biotechnical control is shortly an agricultural control method by disrupting the behavior of insects, affecting their biological and physiological structure. Pheromones as natural substances, colors, various chemicals, etc. natural and artificial materials are used in this method. Insects drawn to a certain area by attractants caught and neutralized here with different types of traps. In Pest Insects Control, that known as Agricultural Control, applied with three different techniques;

- 1- Chemical Control
- 2- Biological Control
- 3- Biochemical Control

Biotechnical control is an agricultural control activity carried out by influencing the behavior, biological and physiological structures of plant pest organisms. Natural

and artificial substances, that used in biotechnical control, like pheromones color traps, light traps, repellents, traps, attractants, anti-feeding etc. constitute the basic inputs of this control.



PHEROMONE TRAPS

Pheromones are chemical substances, that regulates social relations members of the same species. They are called sex pheromones, assembly pheromones, alarm pheromones, egg-laying pheromones etc. Shortly we can say that insects communicate with chemical secretions called “Pheromones”. Pheromones are basically used in 3 different types.

1- FOR MONITORING: It is used for spraying at the correct time and for survey purposes. In this method, the adults coming into the traps are counted 1-2 times a week and the maximum flight is determined. Spraying 7 days after the maximum flight is the correct spraying. This process is repeated for each generation. In the forecast warning station gardens, temperature data and egg monitoring are used to find the most appropriate spraying time. Then it announced to the producers.

2- FOR MASS CATCH: It is used for control purposes. Only males or individuals of both sexes in the garden are captured and rendered harmless. It is an effective control method.

3- SURPRISING TECHNIQUE: It is used for control purposes. The area where the pest is located is saturated with pheromones, communication between insects is disrupted, they cannot mate. It is an effective control technique.

Pheromones loaded into natural rubber dispensers attract insects to a specific point. Here it is essential to catch and neutralize the insects with traps. For this purpose, many types of traps have been devel-

oped. We can generally name them as sticky, non-sticky, water traps, light traps, attract and kill. Most of the traps are like inkwells. Ink does not spill out of the inkwell. Similarly, insects that enter the trap cannot get out. Entry holes of traps can be sometimes below, sometimes above, and sometimes on both sides. This is due to the flight behavior of the pest insect. In general, species of flies (Diptera (two wings)) fly from the bottom up. We observe from the fly’s flight on the window-pane. Butterflies (Lepidoptera) fly from top to bottom. For this reason, traps entrance holes are usually at the top for butterfly, and at the bottom for flies.

COLOR TRAPS: These traps are prepared by examining the orientation of insects to certain colors. It is prepared by applying Insect Catching Glue on a material such as plastic and paper in different colors as usually yellow, red, blue, white etc. Yellow sticky traps are used monitoring and mass trapping for many pests like notably whitefly, leaf miner fly, aphids. It is necessary for Turkish agriculture to use it especially in all greenhouses of our country, in the fight against carrot fly and onion fly.

Yellow Sticky Traps are not effective enough for some pests cherry fruit fly, olive fruit fly etc. In this case, it must be combined with an attractant.

Blue Sticky Traps are used to control Thrips. White sticky traps are used for sawfly control. Black sticky traps are used in the control of flour moth and tomato moth.

Bark Beetles cause significant damage to hard and pome fruit trees and vineyards throughout our country, especially in the hazelnut areas of the Black Sea region. Chemical control is very difficult because the pest lives under the bark and comes out of its galleries only in adulthood. For this reason, it is recommended to use a red sticky trap where there is bark beetle damage.

WATER TRAPS: It is widely used especially in the control of bark beetle and tomato moth. It is mainly prepared by hanging an attractant on one point of a vessel containing water.

UV LIGHT TRAPS: Light attracts many types of insects. These traps are also prepared on this basis. The insect, that comes to UV light trap, dies with sticking to sticky card or with electric arc. Types whose killing mechanism is electric arc are

prohibited because they cause bacteriological contamination.

BARRIER: Many insect species reach from the crown of the tree to the soil, from the soil to the branch of the tree by passing through the trunk. Some of these species are ant, pistachio psyllidae, black weevil, brown-tail moth, pine processionary, fall webworm, dusky clearwing, gypsy moth etc. A trap tape is created for pest insects, if 1-2 rows of duct tape is wrapped around the trunk of the tree and covered with insect trapping glue. A copper sheet can be wrapped around the tree trunk for snail control. A nice trap will be prepared for the insects looking for a safe place to enter the diapause, if the corrugated cardboard cut to the tree trunks with a width of 2.5 cm is wrapped around the tree trunks.

HUNDREDS OF TRAP TYPES CAN BE CREATED BY COMBINING THE TRAPS WE MENTIONED ABOVE. OUR GOAL IS TO RESEARCH WHAT WE CAN DO BEFORE USING PESTICIDES.



IN A NON-POISON ENVIRONMENT TO HAPPY TOMORROWS

PHEROMONE TRAPS IN BIOTECHNICAL CONTROL



Agricultural Engineer MSc
Dr. Tuncer ÇEVİK
Kapar Organic Agriculture Founder



Agricultural Engineer MSc
Dr. Caner ÇEVİK
Kapar Organic Agriculture
General Manager



Since the beginning of the last century, chemical pesticides, called pesticides, have been used in agriculture to increase agricultural production. And so many problems came with it. A few of these problems are start of the rapid contamination of soil and water resources, the emergence of many diseases due to pesticide residues in food, and the extinction of many living species. As a result of the negative effects of pesticides on humans and the environment, an agricultural production technique called organic agriculture (ecological agriculture), which is carried out without the use of chemicals, has emerged. This method is based on trapping and killing harmful insects by attracting them with attractors

such as color, odor, pheromone, light, food or disrupting their behavior (biotechnical control) and wide research has been carried out all over the world. One of the most important results of these studies was the determination that many insects such as whitefly, leaf miner flies, thrips, aphids, fruit flies, olive fly and cherry fruit fly are attracted by the bright yellow (fluorescent yellow) color.

As it can be understood from the explanations above, the use of this technique, which has great benefits, is important in terms of public health, first of all. The failure of insecticide residues in the greenhouse products obtained will facilitate the export of the product at higher prices. Another benefit is that it will create a strong infrastructure for the rapidly developing organic agriculture in our country as well as in the whole world, and it will increase the variety and amount of organic farming products in our country. To all this, it should be added that it will make a significant contribution

to the protection of soil, water and wildlife.

We can list the advantages of these traps as follows;

Advantages of Biotechnical Control:

- No endurance problem
- Targeting only the pest to which it is applied
- Trap systems make the control visible
- Being Environmentally friendly, non-toxic
- Protecting the nature and natural balance by reducing the use of pesticides
- Government support for producer-wide dissemination
- Allowing the most effective application time to emerge in the use of cultural measures
- Increases the sustainability index in integrated control applications
- Increased adoption of sustainable agricultural methods (organic and good agriculture)

KAPAR®MFF

MEDITERRANEAN FRUIT FLY TRAPS



Scientific Name: Mediterranean fruit fly, medfly (*Ceratitiscapitata*)

Host Plants:

It is a polyphagous pest. In our country, the most important host plants are apricot, quince, peach, fig, persimmon, pomegranate, avocado and citrus. It has the potential to survive in pear, prickly pear, jujube, apple and wild species, which are secondary hosts in cases where preferred hosts are not available.

Adults are usually 2/3 the size of a housefly. The general color of the body is tawny. The wings are broad with black and pale brownish stripes. Since MFF polyphagous is a pest, it can find food and hosts throughout the year. Overwintering adults emerge in late spring and early summer. They mate and lay eggs on days when the temperature is over 16°C. In the Aegean region, it can produce 4-5 generations per year, and in the Mediterranean region 7-8 generations per year.

Type of Damage

Adults of Mediterranean fruit fly cause yellowish spots on the spots where they lay eggs when citrus and pomegranate fruits reach maturity, and brownish spots on the spots where they lay eggs on ripe fruits. The main damage of the Mediterranean fruit fly is caused by its larvae. The larvae feed on the fleshy part of the host fruits and cause softening and collapse in the fruit. Infected fruits prematurely ripen and fall.

Damage to citrus fruits, pomegranates and other products that are exported is very important for the country's economy. If such fruits are infected or contaminated, exports are prevented. And the product is not allowed to be exported abroad. The annual damage rate can reach up to 80%. In our country, it is continuously active along the coastline of the Mediterranean and Aegean Regions.

Monitoring

The traps for monitoring should be 3 traps set after the trees have bloomed. The traps are counted 2 times a week and the flies in the traps are followed.

Mass Catch

Close to the softening of the fruits, usually 6-8 weeks before the fruits start to change color, the number of traps set is increased. Mass control is carried out by hanging the traps at 15-20 m intervals. It is proper to do it in early August.



Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 8-10 weeks.

Usage and Storage Conditions of Pheromones:

- Traps are hung on the southern part of the tree at a height of 1-1.5 m from the ground.
- Traps must stay in the field until crop harvest.
- The pheromone dispensers should be placed in the traps with the help of gloves without touching them with bare hands.
- The duration of action of pheromones is 8-10 weeks. During these periods, the pheromone must be renewed.
- Species-specific pheromones should not have a negative effect on other insects found in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



Kapar®

“A non-poison environment, Happy tomorrows”

KAPAR®SB SCARAB BEETLE PHEROMONE TRAPS

Scientific Name: (Scarab Beetle - Epicometus (Tropinota) Hirta)

Host Plants: Many fruit trees, including citrus, crops, vineyards, ornamental plants, some vegetables and weeds, and rapeseed.

Adults are 10 mm long, black matt colored with white spots. Larvae are manas type. Spends the winter in soil and manure piles during larval and adult stages.

Type of Damage

Adults that appear in early spring cause great damage by first eating the flowers, leaves and fruits of weeds and vegetables such as broad beans. They mate and lay their eggs in topsoil-rich soils. After 1-2 weeks, the hatched larvae feed on the roots of weeds. They complete their development in 6-9 weeks and become pupa in a space they create in the soil. They give one offspring per year.

Biotechnical Control

With KAPAR®SB pheromone traps it is possible to control without harming the environment, without killing beneficial insects in nature, without burning flowers. Insects are attracted to traps using pheromones and they are caught. Pheromone traps don't include poisonous substance. Use in good agriculture, organic agriculture, IPM (Integrated Pest Management) applications.

Traps

It is possible to use pheromones by attaching a 24 cm blue funnel to the end of a large plastic bottle or with a blue basin.

Usage and Storage Conditions of Traps:

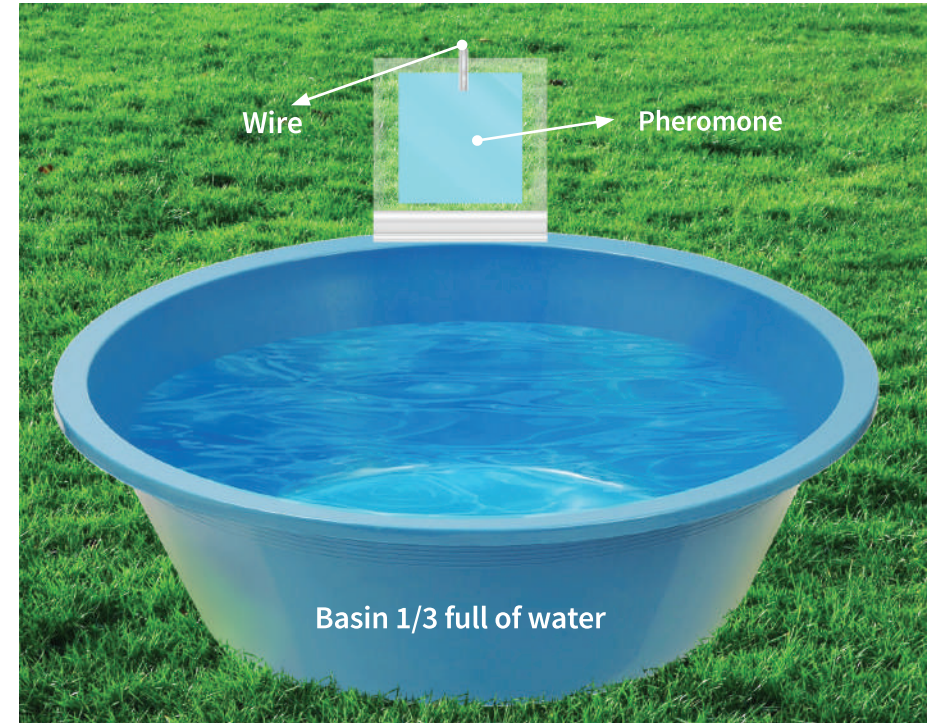
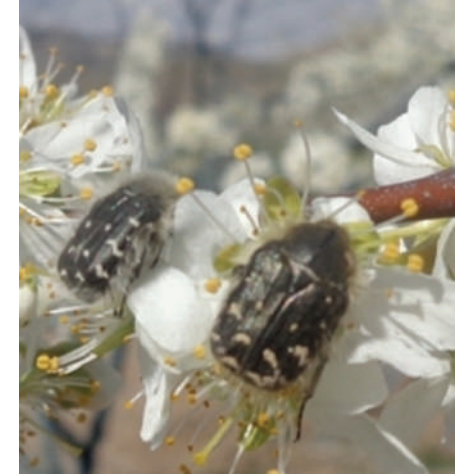
- Traps should be set at intervals of 15-20 meters in the orchards 10 days before the trees bloom.
- Water is filled halfway into the plastic bottle or basin and some dish-washing liquid is added to the water.

- Pheromones are hung on the edge of the funnel or on the edge of the basin with the help of wire, without touching the water and without being removed from their transparent bag.

- Funnel-type traps are hung on tree branches, and basin-type traps are placed on the ground.

- Traps should be checked at regular periods.

- Pheromones can be stored in their original pack in a cool place for 2 years.



KAPAR®BB BARK BEETLE TRAPS



Scientific Name: Shot-hole borer (*Xylaborus dispar*), *Lymantor coryli*

Host Plants: Hazelnut

Shot-hole borer and *lymantor coryli* are among bark beetle species that cause significant damage to fruit and forest trees all over our country. These are the most important pests of hazelnut fields in the Black Sea region. These pests spend the winter in the galleries they open on the hazelnut branches during the adult period. From March onwards, the average daily temperature reaches 18-20 degrees. So, they come out of the galleries where they spend the winter, mate and the mating females lay their eggs in the galleries they open in the hazelnut branches. The going out of the adults from the galleries, in the spring; it is seen in March, April,

May, and in summer from June to the end of September. Flights are not regular and are in the form of collective flights depending on the air temperature. They give one offspring per year.

Type of Damage

The adult of the shot-hole borer pest enters the trunk of the branch by making a hole with a width of 2 mm. The pest opens transverse and longitudinal galleries in the branches, causing the hazelnut branches to dry out and the gardens to be completely lost over time.

The shot-hole borer pest spends most of its life in the galleries it opens in hazelnut branches. In April, the temperature reaches almost 18-20 degrees. The adults start to emerge from this month in order to mate and lay eggs in the spring and continue until the end of August. For this reason, it is not possible to control with pesticide achieve the desired success by only using pesticides against the shot-hole borer pest.

KAPAR®BB Traps

Bark beetle traps consist of two parts. Two red colored plastic sheets of 20-25 cm, coated with KAPAR® Insect Catching Glue, and a hung chamber underneath. Attractive mixture.

Type of Using Traps

Two red colored sheets coated with KAPAR® Insect Catching Glue are taken out of the package and intertwined as seen in the picture. Under the color traps, the empty chamber, which comes out of the package, is attached. The attractant mixture is mixed with water at a ratio of 1/1 and 0.4 L of the mixture is added to each empty chamber. When the traps are ready, they are hung on the land when the temperature rises above 18 degrees. The traps are checked once a week and a new one is added instead of the decreasing attractant.

Monitoring

These traps should be hung in hazelnut gardens as 3-4 pieces per decare in June-July and August when pests coming out is high.

Mass Catch

KAPAR®BB (Bark Beetle) Trap is hung on the hazelnut branches at 15-20 m intervals in the garden and at a height of 1-1.5 m. Trap chambers are checked once a week and an attractant is added as much as the decreased amount. When the red color traps are filled with insects, they should be replaced with a new one.

Usage and Storage Conditions of Traps:

- Traps should be checked at regular periods.
- When the temperature exceeds 18 degrees, it is hung on the branches of the south of the trees and at a height of 1-1.5 m from the ground.
- When the attractive mixture decreases, a new one is added instead.
- When the red color traps are filled, they should be replaced with a new one.
- Traps can be stored in their original pack in a cool place for 2 years.



KAPAR® PHEROMONE TRAPS AGAINST WAREHOUSE PEST MOTHS

Scientific Name: Mediterranean Flour Moth - *Ephestia kuehniella*)

Tobacca Moth - *Ephestia elutella*,

Raisin moth - *Ephestia cautella*,

Indian Meal Moth, Driedfruit moth – *Plodia interpunctella*

Host Plants: Cereal, cereal products, flour, dried fruits, cocoa, spices.

Type of Damage

Foods consisting of stored cereal and cereal products are attacked by the above-mentioned pests and are exposed to losses from various ways. Warehouse pests feed heavily on smudged products and cause weight and seed loss. In addition, the product loses quality due to the residues, feces and web substances secreted by the pests.



These pests cause weight and quality loss in the products they smudged. In case of intense smudged, mold, redness and putrefaction occur in the product. Most importantly, the consumption of products smudged with this pest is extremely harmful to human health. They can cause respiratory problems, itching and loss of appetite.

Type of Using Pheromone Traps:

- It is used via pheromone dispenser, delta trap and bucket type trap.
- Traps are hung at a height of 1-1.5 m and in the place closest to the crop, 1 per 100 m2 area.

- Traps are checked once a week and pests are cleaned.
- Pheromone dispensers are replaced every 4-6 weeks.

Delta Trap

The first flight of the pest can be detected by placing sticky cards and pheromones in delta traps. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks.

Bucket Type Trap

The control can be done by using buckets consisting of traps, lower collection chamber, lid, hanging wire and pheromone basket. Traps should be checked at regular periods. The full collection chamber should be emptied and properly moved away from the warehouse.

Storage Conditions

- Pheromones can be stored in their original pack in a cool place for 2 years.
- Traps can be used as long as they are not break down.



CORIENTAL FRUIT MOTH

GRAPHOLITA MOLESTA

The front wings of the butterfly are brownish black, the hind wings are covered with gray scales. The pest spends the winter under the bark on the trunks of trees, in crevices and cracks, in various shelters on the soil, in soil crevices and fruit packing places, in the mature larval stage in a cocoon they spin. The offspring adults overwintered begin in the spring to emerge during the flowering period. This emerge lasts until July. The oriental fruit moth, which multiplies rapidly in places with a Mediterranean climate, gives three offspring per year.

Destruction of damaged sprouts in peach orchards by cutting them once a week reduces pest density.

Fruit stores are suitable wintering storages. Rotting peaches in warehouses should be destroyed by buried. Warehouse cleanliness should be given importance.

Type of Damage

The oriental fruit moth causes damage to both sprouts and fruits of trees. The damage potential of

this species is very high. It is the main pest in peach cultivation in open area. The tip of the sprout dries up to 5-7 cm, the sapling becomes bushy, damages the 2nd and 3rd generation of the fruit. The larva, which feeds on the flesh of the fruit, completes its growing and leaves the fruit through the hole it makes. Glue is woven around the fruit entry and exit holes. The disease develops around the holes, the fruit rots. The oriental fruit moth can also be pest for trees such as pear, apple, quince, medlar, cherry and sour cherry, which are close to peach orchards.

Monitoring

The traps for monitoring should be set 3 traps/ha after the trees have bloomed. Traps are counted 2 times a week. If the insects in the traps exceed 4 and if chemical control is preferred, the control should be started.

Mass Catch

The purpose is to catch as many butterflies as possible and prevent

pests from reproducing. For this purpose, 3-4 traps/decars are used. The number of traps can be increased if the population is large. With this type of control without using pesticides, the environment is not harmed and the products obtained are protected from plant pests.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks.

Bucket Type Trap

The control can be done by using buckets consisting of traps, lower collection chamber, lid, hanging wire and pheromone basket. Traps should be checked at regular periods. The filled collection chamber should be emptied and properly removed from the fruit area.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- Species-specific pheromones should not have a negative effect on other insects found in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



TOMATO LEAFMINER (TUTA ABSOLUTA)



The pest multiplies rapidly in places with a Mediterranean climate and can produce 10-12 offspring per year in greenhouses. Depending on the environmental conditions, it completes one offspring in 29-38 days. Butterflies are active at night and hide among the leaves during the day. They lay its eggs, usually on the underside of leaves, buds and sepals of unripe green tomato fruits.

Type of Damage

This species, which has a very high damage potential, is the main pest in open field and greenhouse tomato cultivation. Its larvae damage all parts of the tomato plant except the root and in all periods. The larva hatches from the egg and starts feeding on fruits, leaves, roots and stems. The larva feeds by opening galleries in the leaves of tomato. The galleries opened by the larvae on the leaves are large and appear as transparent cavities. After that these galleries dry up into brown spots. It is possible to see the black colored sawdust-shaped

feces of the pest in the galleries opened on the leaf and fruit. The plant can dry out completely due to galleries opening in the green parts of the plant.

The pest can cause 50-100% crop losses in tomato in intensive populations. All biological periods of the pest can be found on tomato fruit. Therefore, it is transported from one place to another by tomato fruits, seedlings, transportation materials and tools.

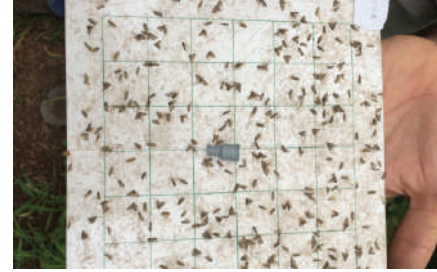
Monitoring

The traps for monitoring should be set 3 traps/ha by seedling period. Traps are counted 2 times a week. If the insects in the traps exceed 4 the control should be started.

Mass Catch

The purpose is to catch as many butterflies as possible and prevent from reproducing. For this purpose, 3 traps/decare are used. The number of traps can be increased if the population is large. With this type of control without using pesticides,

the environment is not harmed and the products obtained are protected from plant pests.



Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks.

Water Traps

The traps are placed at a height of 50 cm from the ground with maximum water in them. Pheromones are placed on the edges of the traps so that they do not touch the water. Some dishwashing liquid or vegetable oil is added so that the insects sink into the water.

Black Sticky Trap

The traps placed in the environment after the insect flight starts



can be used with or without pheromone. Traps covered with insects should be renewed on time.

Usage and Storage Conditions of Pheromones:

- Traps should be set at the time of planting the seedlings. It should be checked at regular periods.
- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- Species-specific pheromones should not have a negative effect on other insects found in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



CODLING MOTH (CYDIA POMONELLE)



Host Plants: Apple, pear, quince, walnut, plum, apricot, peach

Insects mostly spend the winter in their hiding places during the adult, larval and pupal stages. As the weather starts to warm up in spring, they gradually emerged, mate and lay eggs. They can give many offspring until autumn.

Type of Damage

The larvae, which damage the fruit directly, pierce the fruit, open galleries in them, eat the fleshy parts and seeds and leave feces.

Monitoring

For monitoring purposes, traps should be set at 3 traps/ha by flower fall. Traps are counted 2 times a week. The control should be started, if the insects in the traps began to increase and if chemical control is preferred.

Date	Number of Codling moth adults caught in the trap
20.05.2002	0
27.05.2002	1
04.06.2002	3
11.06.2002	17
18.06.2002	10
25.06.2002	5
02.07.2002	1
09.07.2002	4
16.07.2002	6
23.07.2002	13
30.07.2002	8
07.08.2002	3
14.08.2002	1
21.08.2002	0

When we examine the sample chart, the traps were hung on May 20, and the outflow of overwintering progeny reached its highest level on June 11 with 17 insects. Producers who want to carry out timely control should spray 7 days after (the time required for mating, egg

laying and egg opening, in short, the time when the insect eggs open) the detection of insect emergence. By using pheromone traps, an effective control is carried out at the right time by using a small number of chemical methods. Environmental damage is reduced by using fewer pesticides, less labor and less expense. Product quality increases and pesticide residue in products decreases.

Mass Catch

The purpose is to catch as many butterflies as possible and prevent pests from reproducing. For this purpose, 3 traps/decares are used. The number of traps can be increased if the population is large. With this type of control without using pesticides, the environment is not harmed and the products obtained are protected from plant pests.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6

weeks. Traps should be hung on the side branches of the tree in the direction of the prevailing wind and at a height of 1-1.5 m from the ground.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- Species-specific pheromones should not have a negative effect on other insects found in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



THE PLUM FRUIT MOTH (CYDIA - GRAPHOLITA - FUNEBRANA)



Host Plants: Plum, apricot, buckthorn, cherry

The adult is dark gray-grizzly with a straight line on the underside of the upper wings and tiny dark gray spots. The lower wings are lighter and fringed with grizzly-yellow fringes. Wingspan is 13-15 mm.

They overwinter as mature larvae in a tightly woven cocoon under dry and rough bark, in crevices, in hollows at the base of trunks, usually between the forks of branches and sometimes on side branches. They become pupa in spring. In the first week of May, butterflies begin to emerge from the pupae that overwinter. And this flight lasts until the end of June. Most butterflies emerge towards the end of May. During the day, the butterflies remain motionless on the underside of leaves or on the trunk and branches of trees. They become active at twilight and at night. After a while, they mate and lay their eggs on fruits, rarely on

the bottom of the leaves or on the sprouts and branches.

Type of Damage

The larvae of the plum fruit moth damage the plum fruits. The larvae usually enter at the base of the stem, on the sides and where two fruits touch each other. They carve under the fruit skin and reach the core by tunneling through the fruit flesh. First instar larvae attack sometimes more than one fruit. For this reason, one fruit can sometimes have more than one damage point. Second instar larvae can damage 1-3 fruits. Attacked fruits produce gum. It is widespread in the Aegean, Marmara, Black Sea, Central and Southern Anatolia regions.

Monitoring

For monitoring purposes, traps should be set at 3 traps/ha by the flowering period. Traps are counted 2 times a week. The control should be started by choosing the appropriate method, if the insects in the traps began to increase.

Mass Catch

The purpose is to catch as many butterflies as possible and prevent pests from reproducing. For this purpose, 3 traps/decars are used. The number of traps can be increased if the population is large. With this type of control without using pesticides, the environment is not harmed and the products obtained are protected from plant pests.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks.

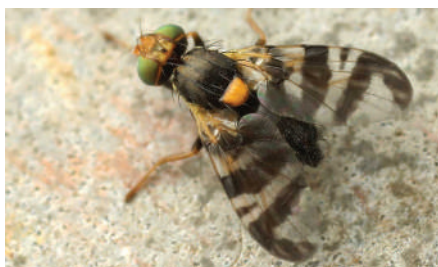
Usage and Storage Conditions of Pheromones:

- Traps should be hung before the plum tree blooms.
- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- Species-specific pheromones should not have a negative effect on other insects found in nature.

- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



EUROPEAN CHERRY FRUIT FLY (RHAGOLETIS CERASI)



Host Plants: Cherry, sour cherry

Cherry fly adult is 4-5 mm in length and has a yellow triangular structure at the tip of the thorax. It spends the winter as a pupa in the soil. Depending on temperature, humidity, rainfall and location, adults emerge from the first week of May. The adults start laying eggs on the fruits about 1 week after emergence. The larva develops by feeding on the fruit flesh, the mature larva passes to the soil to pupate.

Type of Damage

As a result of the larvae feeding inside the fruit, the flesh of the fruit turns brown and rots and fruit falls

occur. In addition, the fruits have low market value at harvest, because they are wormy. The damage of the cherry fly is mostly seen in the middle and late varieties.

KAPAR®CFF (Cherry fruit fly) Traps

The cherry fruit fly trap consists of two parts. 20x25 cm yellow plastic sheet covered with KAPAR® Insect Catching Glue and attractant powder.

Monitoring

After the cherry and sour cherry petals have completely fallen, KAPAR® Cherry Fruit Fly Traps are hung to the south of the trees to represent the garden. The traps are checked several times a week for presence of cherry flies or not. When the cherries are in the veraison period, if there are insects in the traps, appropriate control is done.

It is important to determine the correct spraying time in the fight

against cherry fly. Because cherry fly adults lay their eggs under the fruit peel of cherries and sour cherries. It is more difficult to kill the larvae that develop here with pesticide. At the same time, spraying before the emergence of cherry fly adults increases environmental pollution and causes loss of time and money.

Mass Catch

One of KAPAR® Cherry Fruit Fly Trap is hung on each of the tall trees after the flower petals of cherry and sour cherry trees are completely fallen, which in gardens with low wand medium density of cherry fruit fly (less than 10 pieces/week/trap). In gardens with dwarf trees this trap is hung at 10m intervals, in the south direction, 1-1.5m above the ground. Thus, the cherry fruit fly adults in the garden are caught and killed. When the traps get dirty, they are replaced with new ones.

Usage and Storage Conditions of Traps:

- Traps should be checked at regular periods.
- It is hung on the branches of the south of the trees and at a height of 1-1.5 m from the ground, after the flower petals of cherry and

sour cherry trees are completely fallen.

- Attractants have a duration of action of about 2 months.
- When the yellow color traps are filled, they should be replaced with a new one.
- Traps can be stored in their original pack in a cool place for 2 years.



PHEROMONE TRAPS FOR KAPAR® IPSTYP, KAPAR® ORTERO AND OTHER FOREST PESTS

Eight-spined spruce bark beetle: *Ips typographus*

Mediterranean pine engraver beetle: *Orthotomicus erosus*

Six-spined engraver beetle: *Ips sexdendatus*

European firegraver beetles: *Pityokteines curvidens*

Mouthparts of the bark beetle: *Ips acuminatus*

Because of their high reproductive energy, insects can multiply in a short time and threaten trees, groups of trees and even a whole forest. Bark beetles, butterflies and leaf bees are the most common and damaging insect species in the forests of our country. Bark beetles kill the tree due to the damage they cause to the bark and cambium and therefore pose a major threat to the forests of our country.

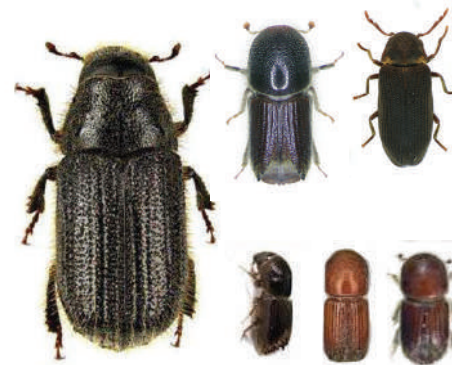
Chemical control in forest areas is not preferred because it harms the

ecosystem and other beneficial organisms in nature. For this reason, control is provided by using pheromone traps without harming other living things and the environment.

Usage and Storage Conditions of Pheromone Traps:

- Scandinavian type three funnel traps, six funnel traps, radiator type traps, bucket type traps are used to control pests in forest areas.
- The traps are hung at a height of 1.5-2 m above the ground on a wooden or metal inverted L-shaped stake that is firmly anchored in the soil.
- Traps are hung at a distance from healthy trees.
- Traps should be checked frequently and insect catching chambers should be emptied.

- The pheromone bag is hung from the hook at the top of the trap through the hole in the bag without opening or drilling.
- Pheromones should be hung using gloves, without touching them with bare hands.
- The effect period of pheromones is 10-15 weeks. During these periods, the pheromone is renewed. A new one is added next to the old pheromone bag.
- The species-specific pheromones don't have a negative impact on other insects in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



KAPAR® RPW

RED PALM WEEVIL

PHEROMONE TRAPS

(*Rhynchophorus ferrugineus*)



Males live 50–120 days, females 50–109 days. This varies by region. The whole life period lasts about 4 months. It has been recorded that it can reach a distance of 900 m in one flight. It can give 3 offspring at a temperature of 25–27°C per year.

Type of Damage

Larvae do the damage. The young larvae, that hatch from eggs, enter the trunk, where they feed on soft fibrous tissue and make tunnels. Since the larva spends its life completely inside the trunk, at the beginning it is very difficult to detect the pest and the damage it causes.

Monitoring

For the detection of the pest, one trap per hectare is hung in parks, gardens and nurseries with palm trees. For palm trees in rows on roadsides and middle sidewalks, a pheromone trap is hung every 1 km.

Host Plants: Plants of the palm genus of the family Palmae (Areaceae), persimmon

Adults are reddish brown and cylinder and 35 mm long and 10 mm wide. Beetles color is dark red. The length of the head and proboscis is 1/3 of the total length of the body. Proboscis is reddish brown from above and dark brown from below, long, curved and protruding.

Adults become active in case the temperature is above 12–14°C.

Mass Catch

For mass catch, 4-6 traps are hung per hectare in parks, gardens and nurseries with palm trees. For trees on the roadside, a pheromone trap is hung every 100 m.

Three-Funnel Trap

It consists of three black colored funnels, a hanging wire inside the upper funnel, a hat and a white colored collection container.

Usage and Storage Conditions of Pheromones:

- Traps are hung 2-2.5m above the ground.
- Traps should stay hanged during the time the adults are active in the wild, usually from late March to late December.
- Traps should be checked frequently and insect collection chambers should be emptied.
- The pheromone bag is hung from the hook at the top of the trap without opening or drilling.
- Pheromones should be hung using gloves, without touching them with bare hands.
- The effect period of pheromones is 10-15 weeks. During these peri-

ods, the pheromone is renewed. A new one is added next to the old pheromone bag.

- The species-specific pheromones don't have a negative impact on other insects in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



KAPAR®PTM POTATO TUBER MOTH PHEROMONE TRAPS



Potato Tuber Moth, *Phthorimaea operculella* (Zeller)

Host Plants: Cultivated plants such as potato, tomato, tobacco, eggplant, pepper

Its body is thin and long, its wings are 5-6 mm, its antennae are longer than its body. The front wings are grayish brown, with dark brown spots on the top. The mature larva is 8-10 mm long and its head and neck are brown.

The pest spends the winter as larvae and pupae on potatoes left in the barn or field. With the average temperature reaching 15°C in the spring (end of March-early April), the adults emerge and start to lay eggs. Mating females lay their eggs on the underside of leaves, flower buds, and even sprouts of eggplant and potato plants at night. After the larvae complete their growth, they pupate in the cocoon that they weave between fresh leaves on the top sprouts. Butterflies are active at night and they give 3-8 offspring per year.

Type of Damage

On potato, eggplant, tobacco and tomato leaves, it feeds between the two epidermises of the leaf and forms transparent cavities in the leaves. Later these transparent cavities turn brown and dry up. The larvae emerging from the eggs laid around the pores on the potato tuber enter the tuber and open uneven galleries. These galleries, which have a hard surface, are filled with white feces. At the mouth of the galleries, the detection of the pest is easily understood by the black colored feces accumulated on the tuber.

Storage

Earthing up and maintenance processes should be done well in potatoes. Harvested potatoes should be transported to storage without stacking them on the field edge. It should take care of taken to attach cage wires to the windows of the potato warehouses so that butterflies do not pass through, not to put

dirty sacks and materials in the warehouse, to clean and disinfect the empty warehouse. Potatoes can be safely stored below this temperature, as pests do not develop below 10°C.

Monitoring

In order to detect adult flight in the field, 2-3 traps should be hung per hectare from planting. For determine whether there is any harmfulness in the warehouses, 1 trap should be hung for a 100m² area as of the end of March. Trap counts should be made weekly.

Mass Catch

The purpose is to catch as many butterflies as possible and prevent pests from reproducing. For this purpose, 3-4 traps/decars are used. The number of traps can be increased if the population is large. With this type of control without using pesticides, the environment is not harmed and the products obtained are protected from plant pests.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pher-

omones should be changed every 4-6 weeks.

Bucket Type Trap

The control can be done by using buckets consisting of traps, lower collection chamber, lid, hanging wire and pheromone basket. Traps should be checked at regular periods. The filled collection chamber should be emptied and properly removed from the fruit area.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- The species-specific pheromones don't have a negative impact on other insects in nature.



KAPAR COLOR TRAPS

KAPAR®WST (WHITE STICKY TRAP)

KAPAR®YST (YELLOW STICKY TRAP)

KAPAR®BST (BLUE STICKY TRAP)

1. KAPAR®WST (White Sticky Trap)

Sizes: 20x25 cm

The traps are created by applying KAPAR®, a colorless, odorless, non-drying and water-proof insect catching glue.

Pests It Controls: Fruit Sawflies

Control

The 20 x 25 cm White Sticky Traps are hung on the tree branches at 15-20 m intervals, 3 pieces per decare at height, when the flower buds begin to swell.

2. KAPAR®YST (Yellow Sticky Trap)

Card Type Trap Sizes: 10x25 cm, 20x25 cm

Roll Trap Sizes: 30x100, 15x100

The traps are created by applying KAPAR®, a colorless, odorless, non-drying and water-proof insect catching glue.

Pests It Controls: Whitefly, leaf miner flies, thrips, aphids, fruit flies, olive fly and cherry fruit fly.

Monitoring

In order to detect the insect population, the yellow sticky trap should be hung approximately 20 cm above the plant, with 20 traps per decare immediately after the seedling period. Yellow traps should be raised in height in parallel with the growth of the plant. Sticky traps are checked frequently to determine the number of insects caught. After the caught adult insects are counted and recorded, they are removed from the yellow sticky traps or the sticky trap is replaced with a new one. The number of insects detected in traps hung for observation purposes is a very effective method in determining the time and form of agricultural control.

Mass Catch

It is recommended to hang 100-120 yellow traps per decare after detecting an increase in insects in monitoring traps. Sticky traps should be checked periodically to see if they are filled with insects. Traps that are covered with pests and therefore have reduced sticky area should be replaced with new ones. This action should be continued until the crop harvest.

3. KAPAR®BST (Blue Sticky Trap)

Sizes: 10x25, 20x25 cm

The traps are created by applying KAPAR®, a colorless, odorless, non-drying and water-proof insect catching glue.

Pests It Controls: Thrips

Monitoring

In order to detect the insect population, the yellow sticky trap should be hung approximately 20 cm above the plant, with 20 traps per decare immediately after the seedling period. Yellow traps should be raised in height in parallel with the growth of the plant. Sticky traps are checked frequently to determine the number of insects caught. After the caught adult insects are counted and recorded, they are re-

moved from the yellow sticky traps or the sticky trap is replaced with a new one. The number of insects detected in traps hung for observation purposes is a very effective method in determining the time and form of agricultural control.

Mass Catch

It is recommended to hang 100-120 yellow traps per decare after detecting an increase in insects in monitoring traps. Sticky traps should be checked periodically to see if they are filled with insects. Traps that are covered with pests and therefore have reduced sticky area should be replaced with new ones. This action should be continued until the crop harvest.



KAPAR® EGM

THE EUROPEAN GRAPEVINE MOTH TRAPS



(LOBESIA BOTRANA)

Host Plants: The main host is the vine. Laurel, forest vine, jujube, blackberry are among its hosts.

Adults have a wingspan of 10-12 mm and a length of up to 6 mm. Mature larvae are 9-10 mm long, yellowish green in color. Females lay their eggs on flower buds, flowers and flower stalks, unripe grape and fruits. The newly hatched larva feeds on buds and flowers. The second progeny larva feeds on the unripe grape, the third progeny larva feeds on the ripening grapes. They usually give 3 offspring.

Type of Damage

The grapevine moth is the most important pest of vineyards with the damage it causes directly on the product. There is loss of quality and quantity in the product during their feeding. Damaged flowers and groves fall. The inflorescences

become sparse. Saprophytic fungi develop in the inflorescences.

Monitoring

Traps are hung as 1 piece/ha before the flowering period and after the temperature reaches 12 degrees. Traps are counted once every 2 weeks until the first insect is seen, and once a week after the first insect is seen. When adult flight is detected, appropriate control is carried out.

Mass Catch

They are placed in the vineyard at 15-20 m intervals; delta traps, funnel traps, water traps etc. Thus, fertilization of female eggs is prevented. A fairly high success is achieved.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emit-

ted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks.

Bucket Type Trap

The control can be done by using buckets consisting of traps, lower collection chamber, lid, hanging wire and pheromone basket. Traps should be checked at regular periods. The filled collection chamber should be emptied and properly removed from the fruit area.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- The species-specific pheromones don't have a negative impact on other insects in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



PEACH TWIG BORER

(Anarsia Lineatella)

Host Plants: Peach, almond, apricot, wild apricot, plum, green plum, cherry, apple

Their butterflies are dark grizzly-grey, and the upper wings are decorated with irregular light and dark gray lines and spots. It spends the winter as a larva. Overwintering larvae feed on flower and leaf buds when they first emerge.

Type of Damage

The larvae of the wintering progeny damage firstly the flower or leaf buds. They pierce the sepals of the flowers by gnawing and become harmful by eating the flower ovaries. By entering the young sprouts from the tip, it causes the buds and sprouts to dry. In summer, as the freshness of the sprouts decreases, the damage to the fruits increases, preferring the fruit to the sprouts. The mode of nutrition in fruit is typical. The young larvae immediately dig under the bark in an curved form or sometimes tunnel through the fruit flesh and advance to the core.

Later, the larvae that emerge from the eggs left by the adults pass to the sprouts and young fruits. They cause shedding by entering the fruits from the bottom of the stem, the sides and the places where the two fruits touch each other. The larvae of the last progeny descend from the bottom of the stem to the core of the fruit and do their damage around the core. A larva usually damages a fruit.

Monitoring

For monitoring purposes, traps should be set at 3 traps/ha by the flowering period. Insect flight is detected by counting the traps twice a week. The control is started by choosing the appropriate method.

Mass Catch

The purpose is to catch as many butterflies as possible and prevent pests from reproducing. For this purpose, 3 traps/decare are used. The number of traps can be increased if the population is large. With this type of control without using pesticides, the environment is not

harmed and the products obtained are protected from plant pests.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- The species-specific pheromones don't have a negative impact on other insects in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



KAPAR®BB FRUIT TREE BARK BEETLE PHEROMONE TRAPS

Fruit Tree Bark Beetle (*Scolytus Rugulosus*), Almond Bark Beetle (*Scolytus Amygdali*), Large Elm Bark Beetle (*Scolytus Scolytus*)

Host Plants: Apple, pear, cherry, plum, peach, apricot, quince, almond, hazelnut, chestnut. Hard and soft kernels fruit and forest trees.

The size of bark beetles is 1-5mm, the larvae are white in color, 3-3.5mm in length, curved and legless. There are many types. The last-stage larvae of bark beetles overwinter in diapause in numerous galleries they have opened just under the shells. From March onwards, the average daily temperature reaches 18-20 degrees Celsius. They emerge from the galleries where they spend the winter, mate and the mated females lay their eggs in the galleries they open on hazelnut branches. The adults emerge from the galleries in the spring, in March, April, and May, and in the summer from mid-June to the end of September. Flights are not regular and

are in the form of collective flights depending on the air temperature. They give offspring once a year.

Type of Damage

They open galleries in the wood and bark parts of the trees. Gallery shapes of each species are different from each other. When the bark is removed, the galleries are easily seen. With the opening of the galleries, the twigs whose nutrition order is disturbed dry up. The future fruit yield is reduced. They dry up the trees they attack within 2-3 years.

KAPAR®BB Traps

Bark beetle traps consist of two parts. Two red colored plastic sheets of 20-25 cm, coated with KAPAR® Insect Catching Glue, and a hung chamber underneath. Attractive mixture.

Type of Using Traps

Two red colored sheets coated with KAPAR® Insect Catching Glue are taken out of the package and intertwined as seen in the picture. Under the color traps, the empty

chamber, which comes out of the package, is attached. The attractant mixture is mixed with water at a ratio of 1/1 and 0.4 L of the mixture is added to each empty chamber. When the traps are ready, they are hung on the land when the temperature rises above 18 degrees. The traps are checked once a week and a new one is added instead of the decreasing attractant.

Monitoring

If the garden is homogeneous, 3 traps per 1 hectare are hung 1-1.5 m above the ground to represent the garden. If the garden is not homogeneous, 1 trap per 1 hectare is hung 1-1.5 m above the ground. Thus, adult flight is recorded with weekly counts.

Mass Catch

KAPAR®BB Bark Beetle Trap is hung on the tree branches at 15-20 m intervals in the garden and at a height of 1-1.5 m. Trap chambers are checked once a week and an attractant is added as much as the decreased amount. When the red color traps are filled with insects, they should be replaced with a new one.

Usage and Storage Conditions of Traps:

- Traps should be checked at regular periods.



- When the temperature exceeds 18 degrees, it is hung on the branches of the south of the trees and at a height of 1-1.5 m from the ground.
- When the attractive mixture decreases, a new one is added instead.
- When the red color traps are filled, they should be replaced with a new one.
- Traps can be stored in their original pack in a cool place for 2 years.

KAPAR®CB

COTTON BOLLWORM

PHEROMONE TRAPS



(Corn Earworm, Cotton Bollworm, American Boll Worm, Old World Boltworm, Scarce Bordered Straw) (*Heliothis Armigera*, *Chloridea Obsoleta*)

Host Plants: Cotton Bollworm is a polyphagous pest. Generally in Vegetables Tomatoes, Peppers, Eggplants, Okra and also Legumes, Ornamental Plants, Cotton, Corn and Tobacco

Cotton Bollworm adults are beige-brown butterflies with a wingspan of 35-40 cm. Females lay their eggs one by one on the leaves, fruits and fresh sprouts of host plants. A female can lay 700 to 1500 eggs. The incubation period of the eggs is 2-10 days. The larvae complete their development in 11-31 days depending on the temperature and become pupae in the soil chambers they have prepared at a depth of 3-8 cm in the soil. The pupal period is 20 days. Cotton Bollworm gives 3-5 offspring per year.

Type of Damage

The larvae do the damage. The larvae, which feed on leaves in the 1st and 2nd stages, then penetrate into the fruits of vegetables such as tomatoes, peppers, eggplant, okra, chickpeas and lentil beans and feed there. They cause many fruits to be damaged and rotten by passing from one fruit to another. Zarar Şekli

Monitoring

After the cotton bollworm larvae enter the fruit, the control will be unsuccessful. Therefore, it is important to determine the adult emergence in a timely manner. Beginning from mid-May, the first flight of the pest should be detected by hanging traps (3 traps/hectares).

Kitle Yakalama

Amaç, mümkün olduğu kadar çok kelebek yakalayarak, üremelerini engellemektir. Bu amaçla 3 tuzak / dekar kullanılır. Popülasyon çok ise tuzak sayıları artırılabilir. İlaç kullanmadan yapılan bu mücadele türü

ile çevreye zarar verilmez ve elde edilen ürünler bitki zararlılarından korunmuş olur.

By using pheromone traps, an effective control is carried out at the right time by using a small number of chemical methods. Environmental damage is reduced by using fewer pesticides, less labor and less expense. Product quality increases and pesticide residue in products decreases.

Mass Catch

The purpose is to catch as many butterflies as possible and prevent pests from reproducing. For this purpose, 3 traps/decares are used. The number of traps can be increased if the population is large. With this type of control without using pesticides, the environment is not harmed and the products obtained are protected from plant pests.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks. Traps should be hung on the side branches of the tree in

the direction of the prevailing wind and at a height of 1-1.5 m from the ground.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- Species-specific pheromones should not have a negative effect on other insects found in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



KAPAR® OLM LEAF MOTH PHENOMONE TRAPS

(PALPITA UNIONALIS)

Host Plants: It has many hosts. In our country, apart from olive, it has been observed that it feeds on ash, jasmine, privet and white oak.

Olive leaf moth adults are silky white. Adults lay their eggs on the lower and upper surfaces of fresh olive leaves, usually along the vein, sometimes singly or in groups. The larva is yellow when it first hatches and turns dark green as it matures. The mature larva is 20-25 mm in length. Mature larvae become pupae (cocoons) by spinning a web between the leaves they piece together. Leaf moth spends the winter under the ground as the last stage larva.

Type of Damage

The first choice of newly hatched larvae is fresh olive saplings or sprouts. Olive leaf moth feeds voraciously after the 3rd larval stage and consumes all of the olive leaves. Especially the damage of the

last stage larva is very important. The larvae eat all the fresh sprouts of olive saplings and the new and other sprouts of olive trees that will bear fruit the following year. In cases where the larval population is very high, after the 3rd larval stage, they also feed on immature fruits during the veraison period of the olive. Larvae begin to feed by gnawing the skin of olive fruits and cause damage by eating the fruit flesh up to the core. Olive leaf moth spreads in all areas where olives are grown in our country.

Monitoring

Pheromone traps should be hung at the beginning of May (3 pieces/ha), counted once a week and the first adult flight should be determined.

By using pheromone traps, an effective control is carried out at the right time by using a small number of chemical methods. Environmen-

tal damage is reduced by using fewer pesticides, less labor and less expense. Product quality increases and pesticide residue in products decreases.

Mass Catch

After detecting the adult flight in the monitoring traps, the number of traps is increased (3 pieces/decare), the male individuals of the pest are caught and the fertilization of the eggs is prevented. In this way, damage is prevented significantly.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks. Traps should be hung on the side branches of the tree in the direction of the prevailing wind and at a height of 1-1.5 m from the ground.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.

- Species-specific pheromones should not have a negative effect on other insects found in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



OLIVE MOTH

(PRAYS OLEAE)



Host Plants: Olive

The general appearance of the adult butterfly is silver in color. There are black spots on the upper wings and silvery fringes on the margins. Larvae are usually off-white and yellowish. The olive moth gives 3 offspring a year and each generation becomes harmful in different phenological periods of the olive tree. Each generation is named as “leaf offspring”, “flower offspring” and “fruit offspring” according to the period in which it damaged.

Type of Damage

The damage is caused by the larvae of the olive moth. It is possible to examine the damages caused by olive moth larvae in 3 different phenological periods of the olive tree.

Damage of leaf offspring: Larvae become harmful when they feed between the two epidermises of the leaf, the galleries they open, and the tips of the leaves and sprouts.

Damage of flower offspring: Larvae feed between the inflorescences and prevent fruit set by destroying the buds and flowers in the clusters.

Damage of fruit offspring: Newly hatched larvae enter the fruit from the bottom of the fruit stalk, destroying the junction of the fruit and the fruit stalk, and this causes the fruits to fall.

The damage rate of olive moth on fruits varies according to years and regions. In some years, this damage can cause product loss up to 30-60%.

Monitoring

For monitoring the adult population of the olive moth, 1 Delta type pheromone trap per hectare should be used. And this trap is hung on a fruity branch at a height of 1.5-2 m from the ground, in the prevailing wind direction of the trees in the olive groves from the end of March - the beginning of April. The traps are checked once a week and the number of butterflies caught is recorded. Counting is continued until the beginning of July to determine the density during the periods when flowers and fruits reach the size of lentils. Then, in order to determine the density that will lay eggs on the leaf, traps are hung again with the

above-mentioned method from the end of August, and the number of butterflies caught in the traps is recorded until mid-November.

By using pheromone traps, an effective control is carried out at the right time by using a small number of chemical methods. Environmental damage is reduced by using fewer pesticides, less labor and less expense. Product quality increases and pesticide residue in products decreases.

Mass Catch

In low and medium density populations, this pest can be effectively combated by hanging a delta type sexual attractant trap on 3 olive trees at the end of March, when the olive buds start to swell.

Delta Trap

Delta traps are used to detect the first flight of the pest by placing a sticky card and pheromone inside. Insects that come to the smell emitted by the pheromone stick to the sticky card. When these cards are filled with insects, they should be replaced with a new one. The pheromones should be changed every 4-6 weeks. Traps should be hung on the side branches of the tree in the direction of the prevailing wind and at a height of 1-1.5 m from the ground.

Usage and Storage Conditions of Pheromones:

- The duration of action of pheromones is 4-6 weeks. During these periods, the pheromone must be renewed.
- Species-specific pheromones should not have a negative effect on other insects found in nature.
- Pheromones can be stored in their original pack at -18 degrees Celsius until the expiration date.



OLIVE FRUIT FLY (BACTROCERA OLEAE)

Host Plants: Olive, wild olive and phillyrea.

Adults are 4-6 mm long, bright brown and honey colored. The olive fly mostly spends the winter as pupae at a depth of 2-5 cm in the soil or as an adult in olive groves and heaths. After the soil temperature reaches 10 degrees, adults rarely start to emerge from the soil in early April, generally from June. The fruits begin to become suitable for laying eggs end of June. The females mating at this time lay their eggs primarily on large, shiny and oily olive fruits. A female can lay only one egg on an olive fruit. In places where the density is high, 7-9 eggs can be laid on an olive fruit by different females. The place where the egg is laid turns dark brown after a day, this is called “puncture”. Egg opening period in summer is 2 days at 18 degrees. This period extends to 6-10 days in autumn.

Type of Damage

Olive fly is harmful in the larval stage and fruit flesh. The larva

feeds by opening galleries around the core during development. Thus, it causes the fruits to rot and fall, decrease the amount of oil, and partially increase the acidity of the oil. Especially in table olives, its damage is of greater importance. The damage rate can reach 15-30% in normal years and up to 100% in outbreak years.

KAPAR®OFF (Olive Fruit Fly) TRAPS

Zeytin sineği tuzağı iki parçadan oluşur. 20x25 cm ölçülerinde üzeri KAPAR® Böcek Yakalama Zambakı ile kaplı, sarı renkli plastik levha ve cezbedici toz.

Monitoring

Traps must be hung from the first half of June. Adult emergence times vary depending on climate, soil character, variety, etc. varies depending on factors. Taking into account the regional differences, puncture counts are made when the fruits reach egg laying maturity. If there is sufficient puncture and an increase in the number of olive fly

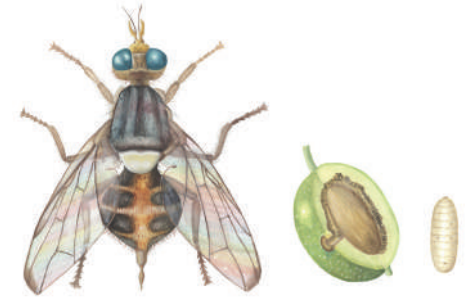
adults caught in the traps, spraying should be started.

Mass Catch

Olive flies start to appear mostly from the beginning of June. During this period, 1 KAPAR®OFF (Olive Fruit Fly) Trap per hectare is hung to the south of the trees, 1-2 m above the ground. These periods are the periods when the adult fly density caught in the traps reaches its maximum. Mass catch technique is applied by hanging KAPAR®OFF trap at 15-20 m (3-5 pcs/min) intervals during the period when olive fruits are susceptible to olive fly attack (the period when the seed starts to lignify, the fruit becomes oily and the fruit is suitable for the fly to lay eggs).

Usage and Storage Conditions of Traps:

- Traps should be checked at regular periods.
- Attractants have a duration of action of approximately 2 months.
- When the yellow color traps are filled, they should be replaced with a new one.
- Traps can be stored in their original pack in a cool place for 2 years.





ORGANİK TARIM

KAPAR®MFF Mediterranean Fruit Fly Traps

KAPAR®SC Scarab Beetle Pheromone Traps

KAPAR® Pheromone Traps against Warehouse Pest Moths

KAPAR®OFM Pheromone Traps in Oriental Fruit Moth Control

KAPAR®TL Pheromone Traps in Tomato Leafminer Control

KAPAR®CM Codling Moth Traps

KAPAR® The Plum Fruit Moth Acorn moth

KAPAR®CFF Pheromone Traps in European Cherry Fruit Fly Control

KAPAR®WST White Sticky Trap in Fruit Sawflies Forest Pests

KAPAR®RPW Red Palm Weevil Pheromone Traps

KAPAR®EGM European Grapevine Moth Traps

KAPAR®YST Yellow Sticky Trap

Fighting flies in the greenhouse without pesticides

KAPAR®BST Blue Sticky Trap in Thrips Control

Sticky UV-Light Traps

KAPAR®BB Bark Beetles Pheromone Traps

KAPAR®BB Pheromone Traps in Bark Beetle Control

KAPAR®CB Cotton Bollworm Pheromone Traps

KAPAR®OLM Olive Leaf Moth Pheromone Traps

KAPAR®OM Olive Moth Pheromone Traps

KAPAR®OFF Olive Fruit Fly Trap

KAPAR®PTM Potato Tuber Moth Pheromone Traps

BIOTECHNICAL CONTROL

WITH PEST INSECTS

Pheromone traps are used in mass catch and diversion techniques to determine the time of control.

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