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Plant protection practices during the dormancy period of fruit crops

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To ensure the production of healthy fruit, it is necessary that care for fruit plantations continues during the winter months, when the plants are dormant. With the onset of the period of relative dormancy of fruit species, the harmful activity of pests and disease agents weakens, but most of them remain in the plantations – in the soil, on the fallen leaves and fruits. This makes it possible to continue control measures against them during the autumn-winter period.

Agrotechnical and mechanical practices

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These measures, carried out during the non-vegetation period of fruit trees, are an important element of Good Plant Protection Practice, since their proper implementation reduces the number of in-season treatments against pests, as well as contributes to obtaining higher-quality fruit free from pesticide residues.

Which are they?

- Pruning of dead branches, stunted and dried trees, their removal from the fruit plantations and burning, with the aim of destroying infestations by ***bark beetles and wood-boring insects, bark beetles, woolly apple aphid, bacterial blight, plum pox virus (sharka), fire blight and other harmful organisms***. After each cut, the pruning tools must be disinfected with a 10% solution of bleach or formalin, and they may also be disinfected with methylated spirits and water in a ratio of 3:1. Immediately after pruning, it is essential to coat the cuts with oil-based paint or white latex paint, to which a copper-containing fungicide should be added, or to use a ready-made tree wound dressing paste to ensure better callus formation and to prevent the entry of secondary infections and infestation by diseases and pests.
- Destruction of caterpillar nests and dried mummified fruits remaining on the trees, as well as fallen damaged fruits, which are a source of infestation by ***defoliating caterpillars***, ***almond seed wasp*** and of infection by ***brown rot***, ***blossom blight of quince*** and others.
- Removal, taking out of the orchards and burning of old and cracked bark from the tree trunks in order to destroy the overwintering stages beneath it of ***fruit moths, mites***, ***pear leaf blister moth, pear psylla, scab moth*** and other pests, as well as the pathogens of ***early brown rot of stone fruits***, ***powdery mildew of apple and peach***, ***fire blight of fruit trees***.
- Whitewashing of the tree trunks and thick scaffold branches to protect them from frost damage and to destroy lichens and mosses on the stems.
- Wrapping young trees with packing paper, corrugated cardboard, polyethylene or other materials to protect them from rodents.
- Soil tillage by digging around the tree trunks to a depth of 8–10 cm and ploughing in the inter-rows to a depth of 18–20 cm. This incorporates the fallen leaves into the soil, activates the mineralization process and thus reduces infection by ***scab of apple and pear***, ***white rust of sweet and sour cherry***, ***red leaf spot of plum***. Ploughing of the soil destroys part of the pupae of the ***cherry fruit fly***, the false caterpillars of the ***stone fruit sawfly***, ***black plum fruit sawfly***, ***sour cherry weevil***, ***hairy beetle***. When cultivating the soil, the root system must not be injured, as this leads to infections with ***bacterial canker*** and pathogens causing ***root rot***. The ploughing depth is determined by the age of the plantation and the type of rootstock.

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- ***Fertilization of fruit trees*** in autumn supplies nutrients to the plants during the period of active root growth and accumulation of reserve substances in the wood, on which their growth and fruiting in the following years largely depends. In bearing fruit species, part of the fertilizers is applied in autumn and another part – during the spring-summer period. Phosphorus and potassium fertilizers are applied every 3–4 years or every other year, in the following rates per 1 decare: ***60–80 kg double granular superphosphate***, ***30–40 kg potassium sulfate*** and ***3–5 t well-rotted farmyard manure***, which is incorporated at a depth of 35–40 cm.
- Nitrogen is usually applied several times during the year. After fruit harvest in autumn, surface fertilization is recommended at a rate of 1/4 to 1/3 of the planned annual dose (15–20 kg per decare), followed by ploughing at 15–18 cm or discing at 6–8 cm. These rates are indicative and their exact amount depends on the age of the trees, the preceding crop, whether the orchard has been fertilized every year, whether another crop has been grown in the inter-rows, the method of ploughing, harrowing and discing, the frequency of irrigation, etc.

Chemical activities

The next very important activity during the dormancy period is the implementation of winter spraying against the overwintering stages of numerous pests of fruit crops. This reduces the population density of many diseases and pests on fruit plants and is particularly beneficial for older trees, where there is an accumulation of inoculum of ***brown rot*** – ***early and late***, ***scale insects***, ***red spider mite***, ***aphids***, ***psyllids***, ***leafrollers***, ***winter moths***.

In pome fruit species, winter spraying limits infection by ***scab of apple and pear***, ***fire blight***, ***black rot***, ***codling moth*** and others. In stone fruits, it reduces infestation by ***shot-hole disease (Coryneum blight)***, ***peach leaf curl***, ***bacterial canker***, ***plum pockets*** and others. In raspberries, it limits ***bud necrosis*** and ***shoot dieback***.

When 70% of the leaves have fallen, stone fruit species should be sprayed with *copper-containing fungicides*.

Apples and pears are treated with a 5% urea solution. The fallen leaves around the trees should also be thoroughly sprayed. In addition to fertilizing the orchard, urea creates favourable conditions for the development of certain microorganisms that destroy scab inoculum in the leaves.

Conditions for conducting winter spraying

To ensure effective spraying, it must be carried out on calm, sunny days, with air temperatures above 5 degrees. The nozzle openings of the sprayers should be 2 mm in size in order to achieve optimal wetting of the tree

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crown, from the top to the base of the trunk. Between 50 and 120 litres of spray solution per decare should be used, depending on the age of the trees and the shape of the crown.