

Peaches & Nectarines

Prunes persica

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1 Plant background

Stone fruit, botanic name Prunes persica, originating from China and from Northern Persia, from the Rosaceae family.

2 Botanical description

Trees grow to a height of 4.5-7.0m with a diameter of 3-4m. The leaves have a "saw tooth" edge. Pink blossoms appear in the spring before the leaves begin budding. Flowering season is relatively long, with beautiful flowers often with many small blossoms. Blossoming begins early spring – February-March in the northern hemisphere, and in the corresponding months in the southern hemisphere.

The trees produce commercial yields from their third year, and keep producing for about 20 years. The highest yields are attained in the 6th to 12th years. Blossoms of most varieties are hermaphrodite, which means they self-pollinate, though some varying require bees for pollination.

Peaches prefer a dry climate during blossoming. Blossoms grow on year-old branches, with two blossoms encircling the growth buds. Fruit ripens 3-5 months after blossoming.

Fruit buds – form on the branch, which grows during the growing season, and will bear the fruit the following season, i.e. year old branches bear the fruit.

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3 Varieties

There are two main varieties: Freestone (as its name implies the flesh separates easily from the stone), and Clingstone (a harder variety, the flesh does not separate easily from the stone, as implied). There are a large number of varieties for different periods, starting from early summer through to autumn (end of October).

The most famous Freestone varieties are Alberta, Hale, Red haven, Jubik, Gold queen, Springcrest. The best know Clingstone varieties are Fortuna, Puloro, Johnson, Harbelle, Garnel beauty. In general, there are thousands of peach varieties.

4 Crop climate conditions

Due to early blossoming, frost is problematic in most countries where peaches grow. Peach varieties grow in a wide range of climates from tropical to sub-artic

(northern Canada). Peaches require a varied range of cold units, but mainly 600-900 units. In some new varieties 200 cold units are sufficient. Tree branches can withstand cold of -32°C, but blossoms suffer damage at -2°C.

5 Leading peaches and nectarines growing countries (2002)

Country	Planted area (ha)	Production (tons)	Yield (T/ha)
China	549,800	5,29,800	9,570
Italy	92,700	1,586,600	17,100
USA	76,800	1,440,200	18,600
Spain	71,600	1,247,400	17,420
Greece	52,500	739,600	14,090
Mexico	38,600	198,000	5,280
Egypt	34,000	257,000	7,560

6 Growing season

Peaches require 90-180 days from blossoming to ripening, with early varieties ripening in July and late varieties in September-October.

7 Rootstock

Nectarine rootstocks are mainly, Seedling, Merobalan, Apricot, and rootstocks of almond / peach. Peach rootstocks are mainly varieties of peaches.

8 Soil

Medium light soils, well-drained soils are preferable; optimal pH is 6-7. In heavier soils, trees should be planted on mounds. Trees should not be planted in soil without proper drainage.

9 Nursery

It is common to graft saplings in the nursery, and plant them during dormancy. Saplings are planted with roots exposed, and not in bags, though it is possible to prepare one-year saplings that are planted in a lump.

10 Tree treatments

Standard pruning is vase shaped, which is compatible with the tree's shape, and enables light and radiation penetration to the fruit and foliage. There are additional

pruning methods, such as hedge pruning, and central axis. With many varieties, manual or chemical thinning out is required, so that fruit will grow to required size.



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11 Harvest

normally manually harvested, but in industrial orchards for cut fruit and for juice, harvesting is mechanical.

12 Tree spacing

traditionally trees are spaced 6x6m, with about 300 trees per ha; in the densely planted orchards, trees are planted 4.0-4.5x2m, with 1,000-2,000 trees per ha.

13 Irrigation

Irrigation coefficients – Kc based on pan evaporation rate according to the northern hemisphere (the Kc also changes according harvesting seasons).

General water requirements depend on the harvesting

date: 450-750mm per season.

Beginning of irrigation – depends on the soil moisture conditions, blossoming and leaf budding in the spring.

In regions where there are summer rains – rainfalls exceeding 5mm must be taken into account.

Harvest dates	Spring		Summer			Autumn	
	April	May	June	July	August	September	October
1-10/5	0.20	0.40	0.25	0.25	0.25	0.20	0.15
1-10/6	0.20	0.40	0.50	0.40	0.25	0.20	0.15
1-10/7	0.20	0.40	0.60	0.65	0.30	0.20	0.15
1-10/8	0.20	0.40	0.60	0.60	0.80	0.30	0.15
1-10/9	0.20	0.35	0.65	0.60	0.80	0.85	0.40
20/9	0.20	0.40	0.50	0.60	0.75	0.75	0.40

14 Critical stages for water stress in the soil in peach and nectarine orchards

Water stress during the critical stages could result in serious damage and a reduction in yields, mainly

during the blossoming and fruit-set, and the fast development of the fruit stages, from April to June in the northern hemisphere, and during the corresponding months in the southern hemisphere.

15 Irrigation management with water shortages in peach and nectarine orchards – deficit irrigation

Following are several means of action that will enable deficit irrigation, while reducing economic damages to the orchard and to the yields.

- a. Apportion water based on profitability of the sections, according to tree conditions and harvest dates, wherein the better sections will receive the necessary water quantities, at the expense of the poorer sections.
- b. Water is apportioned according to expected yields in the orchard sections. Sections where a high yield is expected, will receive water at the expense of sections, where expected yield is low.
- c. It is recommended to thin out the fruit, removing the small fruits and leaving the large fruits on the

- branches. This can be done manually or chemically.
- d. Reduce the canopy by pruning, thus reducing the water evaporation from the foliage. This is particularly important in stone fruits, such as peaches and nectarines. When pruning trees, it is important to be careful when pruning, as this could cause excessive vegetative growth.
- e. Green pruning is preferable, and in early varieties, summer pruning is possible.
- f. The yield must be adapted to the allocated water allowance, and not the water to the yield.
- g. The peach fruit grows rapidly during two periods: (1) after fruit-set, and (2) before ripening. The period between these periods is called the stone-hardening stage, during which the water quantities can be reduced significantly, and this should be taken into consideration when determining water applications.



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16 Recommended irrigation method

Drip irrigation is recommended – in older orchards with traditional spacing, 1-2 laterals per row; in closely planted orchards – one lateral per row. The recommended distance between drippers is 0.5-0.6m. Discharge rate will normally be 2.3 l/h. Irrigation frequency will be according to soil type, every 1-3 day.

The accepted equipment in mountainous regions is Ram, and in level terrain Tiran or Ram, and UniRam for subsurface drip. Irrigation should be applied according to soil type every 1-3 days, and pulse irrigation. Just before ripening, the water consumption increases. Irrigation rate: 1.3-1.6 mm/h

17 Fertilization application

Before planting: 400-600kg/ha P_2O_5 and 600-700 kg/ha K_2O . During years 1, 2 & 3 150, 200, & 250 grams N per tree accordingly.

For fruit bearing trees, when yields are high, large fertilizer quantities are needed.
N – 180-200 kg/ha | P – 50-60 kg/ha |
K – 250-300 kg/ha

18 Yields

35-50 tons/ha.

19 Main diseases

Leaf curling, verticillium wilt, rust, powdery mildew, stone brown rot, silvery leaves, rhizopus rot.

20 Main pests

aalytus, erythroneura, pterochloroides persicae, capnodis, scolytidae, cankers, fruit flies (anastrepha),

thrips, oxycareus hylimiponnis, cydia.

21 Frost protection

peaches are sensitive to frost, particularly to early frost. Fruit-set in early varieties area already adversely affected at $-1^{\circ}C$. 90% of the blossoms will be destroyed if temperatures reach $-3.9^{\circ}C$, when the peach tree is

in full bloom. 90% of the blossoms will be destroyed if temperatures will reach $-6.1^{\circ}C$, when trees start to bloom. In light of these data, it is recommended that a sprinkler system be installed for frost protection, using SuperNet for every tree, with an actual irrigation rate of at least 3.5mm/h on the wetted area.

22 Recommended irrigation equipment for apples

Drip Irrigation

Netafim produces and markets a very broad range of products, with the aim of providing solutions for every irrigation need. Therefore, for every region, soil type, farmers' demands, etc., we are capable of providing a solution tailored to these needs.

Following are the general recommendations for three types of equipment, which, according to our experience, can provide the most suitable solutions for crop and grower demands. However, these are not the only possible solutions.

UniRam compensated drippers, with a self-cleaning

mechanism, ensure identical applications of water and fertilizers, regardless of inlet pressure (as long as the pressure is within the recommended limits) and/or topography throughout the irrigation cycle. In addition, this equipment has the following properties: (a) anti-siphon mechanism – to prevent dirt being sucked into the dripperline from outside when the irrigation cycle is completed, which could create a vacuum in the dripperline due to the steep topography, and (b) non-leakage (CNL) mechanism that prevent the dripperline from emptying out at the end of the irrigation cycle, which means that the dripperlines are ready and waiting for the next irrigation cycle, ensuring uniform opening →

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22 Recommended irrigation equipment for apples (continued)

– ideal for short and frequent irrigation applications.

UniRam equipment can be used at flow rates of 1.0, 1.6, 2.3 & 3.5 l/h. Spacing between drippers is between 0.5 – 0.75 cm. Flow rate and spacing between drippers will be determined according to the soil type and the total hours available for irrigation.

UniRam equipment is produced in two wall thicknesses: 1.2 and 1.0 mm. The wall thickness determines the maximum work pressure. These dripperlines, when laid out / rewound and maintained according to instructions, will ensure many seasons of precise and reliable operation.

RAM compensated drippers, with a self-cleaning mechanism, to ensure that all plants in the field will receive identical applications of water and fertilizers, regardless of inlet pressure (as long as the pressure is within the recommended limits) and/or topography throughout the irrigation cycle.

RAM equipment can be used at flow rates of 1.2, 1.6, 2.3 & 3.5 l/h. Spacing between drippers is between 0.5 – 0.75 cm. Flow rate and spacing between drippers will be determined according to the soil type and the total hours available for irrigation.

RAM equipment is produced in three wall thicknesses: 1.2, 1.0 and 0.9 mm. The wall thickness determines the maximum work pressure. These dripperlines, when laid out / rewound and maintained according to instructions, will ensure many seasons of proper operation.

P.C.J.-C.N.L. online drippers are compact anti-drain, pressure-compensated drippers that ensure that the same quantity of water and fertilizer will reach each tree, regardless of inlet pressure (as long as the pressure is within the recommended limits) and/or topography throughout the irrigation cycle.

P.C.J.-C.N.L. online drippers equipment can be used at flow rates of 1.2, 2.0, 3.0, 4.0 & 8.0 l/h. Drippers can be inserted on the polyethylene pipes at the desired spacing. Flow rate and spacing between drippers will be determined according to the soil type and the total hours available for irrigation. It is possible to insert a few drippers when the trees are young, and add drippers in accordance with the trees' growth rate.

The non-leakage characteristic prevents water from emptying out of the dripperline at the end of the irrigation cycle, leaving it full of water and ready for uniform opening and to immediately begin a new irrigation cycle, making it ideal for short and frequent irrigation cycles.

In addition to using drip irrigation, another option is the use of micro-sprinkler irrigation in deciduous orchards.

Micro-sprinkler Irrigation - For Irrigation and Fertigation - Flow compensated sprinklers

- SuperNet – one sprinkler per tree from 20 to 110 L/H with wetted diameter of 1.5m up to 8.0m. It is also available with an upside-down option with insect proof swivels.
- SuperNet – provides full coverage and full overlap of 2X2 up to 6X6 upright or upside-down. Same flow rates and swivels available.
- PowerNet FC for full overlap irrigation with 9-15° and 24° trajectory and 180l/H up to 340L/H.

For Irrigation and Fertigation with Micro sprinklers

- GyroNet - one sprinkler per tree from 27 to 300 L/H with wetted diameter of 1.5m up to 8.0m. It is also available in an upside-down option with insect proof swivels.
- GyroNet - full coverage and full overlap of 2X2 up to 6X6 upright or upside-down. Same flow rates and swivels available.
- GyroNet Turbo - full coverage and full overlap 200-250-300 L/h of 4X4 up to 7X7.
- PowerNet for full overlap irrigation with 9-15° and 24° trajectory and 180L/H up to 460L/H

For Frost protection, coloring and cooling

- SuperNet LR and GS for full above canopy frost protection and cooling in marginal and irregular topography.
- PowerNet FC for full above canopy frost protection and cooling in marginal and irregular topography.





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22 Recommended irrigation equipment for apples

(continued)

- GyroNet and GyroNet Turbo for above canopy frost protection and cooling with very low pressures.
- SuperNet UD (Upside-down) for under canopy frost protection in marginal and irregular topography.
- GyroNet UD for under canopy frost protection and cooling with low pressures.
- CoolNet for evaporative cooling under canopy, especially with marginal.

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