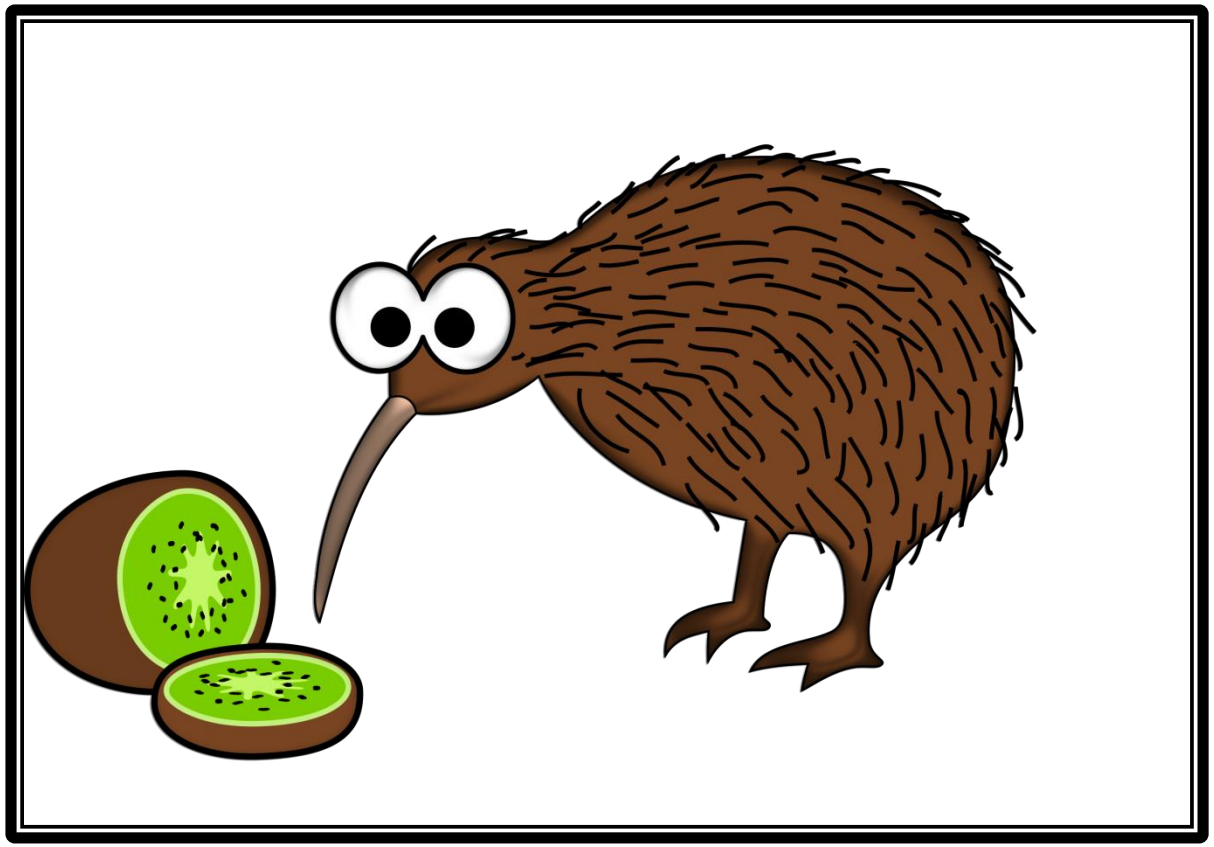
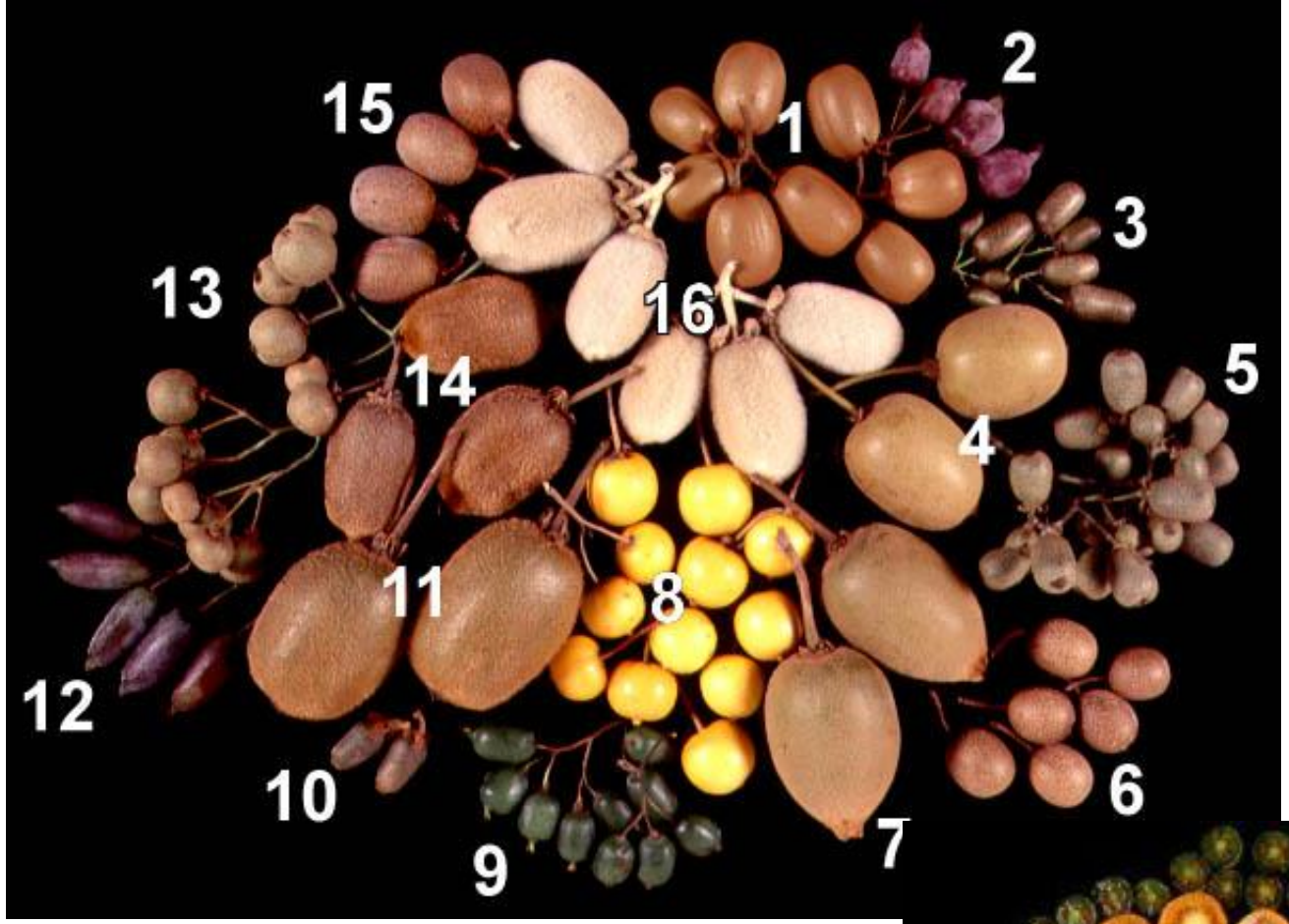
Kiwi fruit



- رودخانه یانگ تزه (جنوب شرق آسیا، چین)
- غذای مورد علاقه میمون ها (macaque peach)
- اولین کشت تجاری در نیوزلند
- ورود به آمریکا ۱۹۰۶ (Chinese gooseberry)
- پرنده بومی نیوزلند



Actinidiaceae
vine
wild type about 3.5 m
about 60 species for
Actinidia

- *A. chinensis*

A. deliciosa

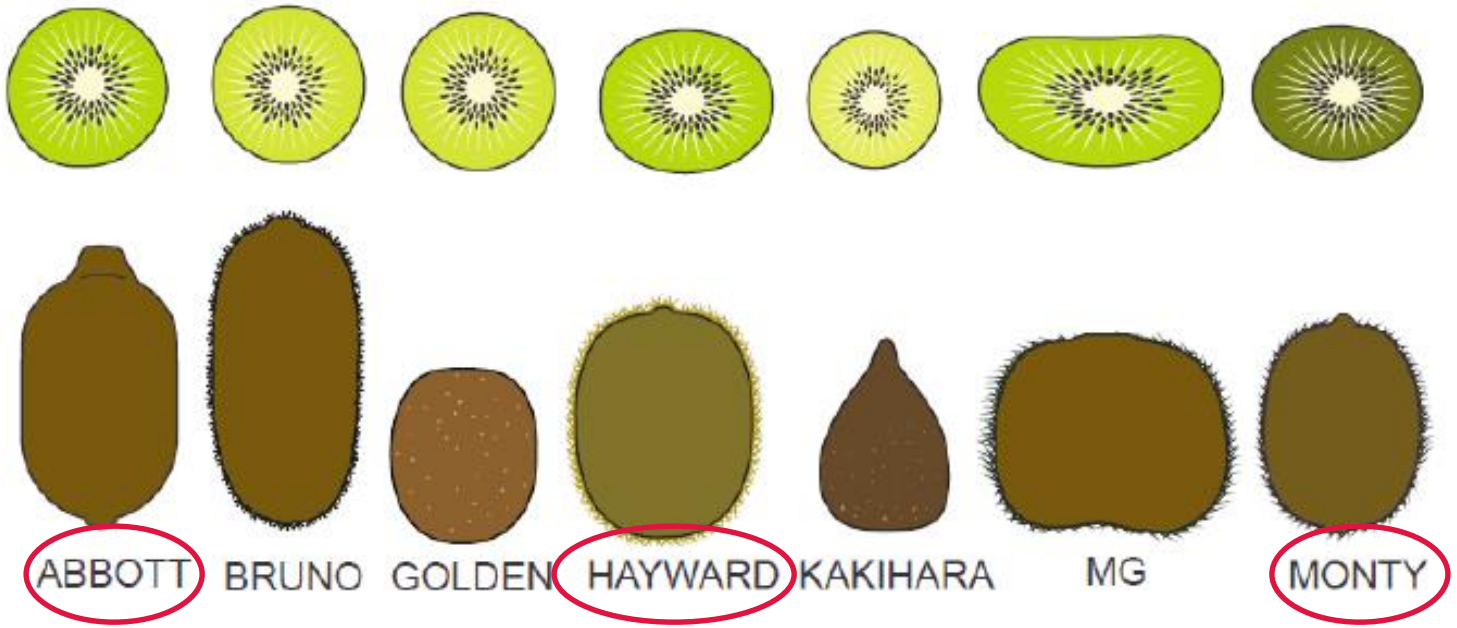
Actinidia arguta

Cold hardy (-32 C)
Insensitive to Frost
Small fruits
Smooth edible skin

Issai: first cultivar of *A. argute* (*less hardy*)

Actinidia arguta 'Ananasnaya'

A cousin of this kiwi, though, the hardy kiwi (Actinidia arguta, Actinidia kolomikta), is much more cold hardy than the plant of the commercially available fruit. It is the subject of considerable interest in our region due to its lovely flavor, relatively smooth (and edible) skin, “out of hand” eating size (about the size of a large grape), and its good shelf life.


ABBOTT
BRUNO
GOLDEN
HAYWARD
KAKIHARA
MG
MONTY

Hayward: The most important commercial cultivar
Long life and large size

- Male canes:

- ‘Mutua’: (cold resistant, many flower and pollens, long flowering time)
- ‘Tomuri’: (cold hardiness less than Mutua, late flowering (=Hayward), many flower)
- M series:
- M51, M54, M55, M57, M58: early-mid flowering
- M52, M56: mid flowering
- M53: late flowering
- ‘Chico’ (Chico Hayward)

- For Hayward: Chico> Mutua> Tomori

Nugget

60 g

Both smooth edible skin
Mature in September
Yellow pulp in maturity (green in immature)
Rich in flavor
High TSS (13.5 to 15)

Eldorado

106 g

Actinidia purpurea

Nutrition

- Kiwifruit is a rich source of vitamin C.
- The skin is a good source of flavonoid antioxidants.
- The kiwifruit seed contains on average 62% alpha-linolenic acid, an omega-3 fatty acid.
- It also contains vitamin E and a small amount of vitamin A & potassium.

Some of the health benefits associated with the fruit include

- Many scientists believe that the Sodium-to-potassium ratio is critical for heart health. This ratio is extremely favorable in kiwifruit.
- The high content of Vitamin C in the fruit makes it an effective immunity booster.
- Regular consumption of kiwifruit ensures good Eye Health prevents Macular degeneration.
- The fruit contains ample amounts of Inositol, which, as studies indicate is an excellent way of treating depression.

Presented by

Pawan Kumar Nagar

Fruit	Latin name	mg vitamin C / 100 grams	mg vitamin C per average size fruit/slice*	Ranking
Apple	*Malus sylvestris*	6	8	fairly good
Apricot	*Prunus armeniaca*	10	4	-
Apricot, canned	*Prunus armeniaca*	3	2	-
Asian pear	*Pyrus serotina*	4	5	-
Avocado	*Persea americana*	8	16	fairly good
Banana	*Musa X paradisiaca*	9	11	good
Fig	*Ficus carica*	2	1	-
Grape, slip skin	*Vitis spp*	4	.01	-
Grape, european	*Vitis vinifera*	11	.60	good*
Grapefruit	*Citrus paradisi*	34	44*	excellent
Kiwifruit, green	*Actinidia deliciosa*	98	74	exceptional
Kiwifruit, yellow	*Actinidia chinensis*	120 to 180	108 to 162	exceptional
Lemon juice	*Citrus limon*	46	3*	-
Lime juice	*Citrus aurantifolia*	29	1*	-
Longan	*Dimocarpus longan*	84	3*	good
Loquat	*Eriobotrya japonica*	1	.5	-
Lychee	*Litchi chinensis*	72	7*	very good
Mango	*Mangifera indica*	28	57	excellent
Peach	*Prunus persica*	7	6	-
Peach, canned	*Prunus persica*	3	3	-
Pear	*Pyrus communis*	4	7	-
**Persimmon, American	*Diospyros virginiana*	66	13*(estim.)	excellent
Persimmon, Oriental	*Diospyros kaki*	40	40*(estim.)	excellent
Pineapple	*Ananus comosus*	15	13	good
Plum	*Prunus sp*	8-10	6	fairly good
Quince	*Cydonia oblonga*	15	15	good
Strawberry	*Fragaria x ananassa*	57	7*	very good
Tangerine/Mandarin	*Citrus reticulata*	31	26	very good

Italy is the largest producer of kiwifruit in the world followed by New Zealand and Chile.

	World	**1,376,531**	
1	**Italy**	384,844	27.96%
2	**New Zealand**	376,400	27.34%
3	**Chile**	240,000	17.44%
4	**Greece**	161,400	11.73%
5	**France**	65,253	4.74%
6	**Turkey**	36,781	2.67%
7	**Iran**	32,000	2.32%
8	**Japan**	28,000	2.03%
9	**United States**	26,853	1.95%
10	**Portugal**	25,000	1.82%

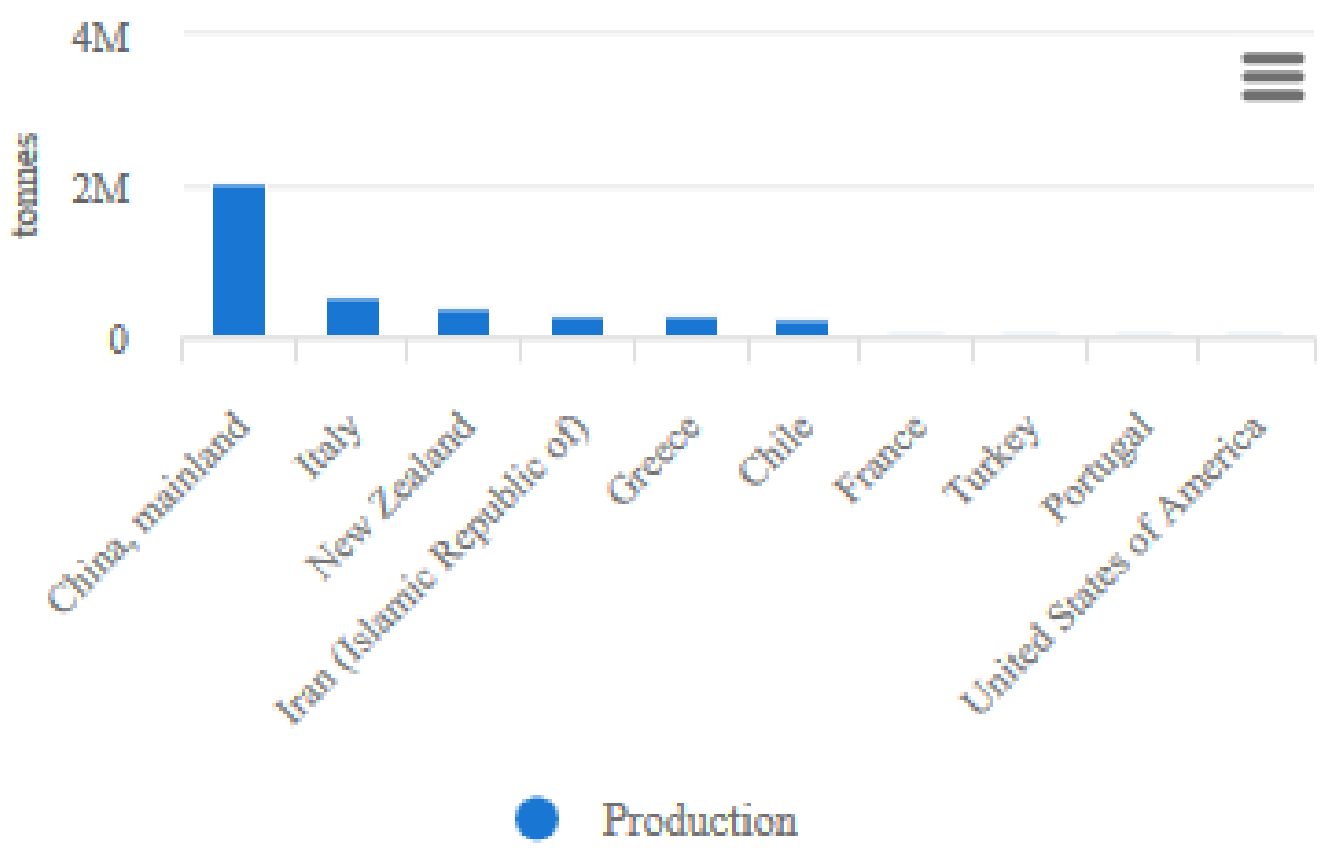
Source: FAOStat.org (Tons)

Kiwifruit

	2013	AreaName
1	1765847	China, mainland
2	447560	Italy
3	382337	New Zealand
4	255758	Chile
5	162800	Greece
6	55999	France
7	41635	Turkey
8	31603	Iran (Islamic Republic of)
9	29225	Japan
10	27300	United States of America
11	21306	Portugal
12	19800	Spain
13	10789	Republic of Korea
14	4281	Israel
15	3000	Australia

Production of Kiwi fruit: top 10 producers

2017



در باغ‌های بارده، قسمت‌های رونده کیوی تشکیل شده است از:

یک تنه، کوردون‌ها، شاخه‌های جانبی (laterals) که Cane نامیده می‌شوند، Caneهای میوه‌ده و Caneهای epicormic یا renewal (بدون برگ، گل و میوه).

Trunk

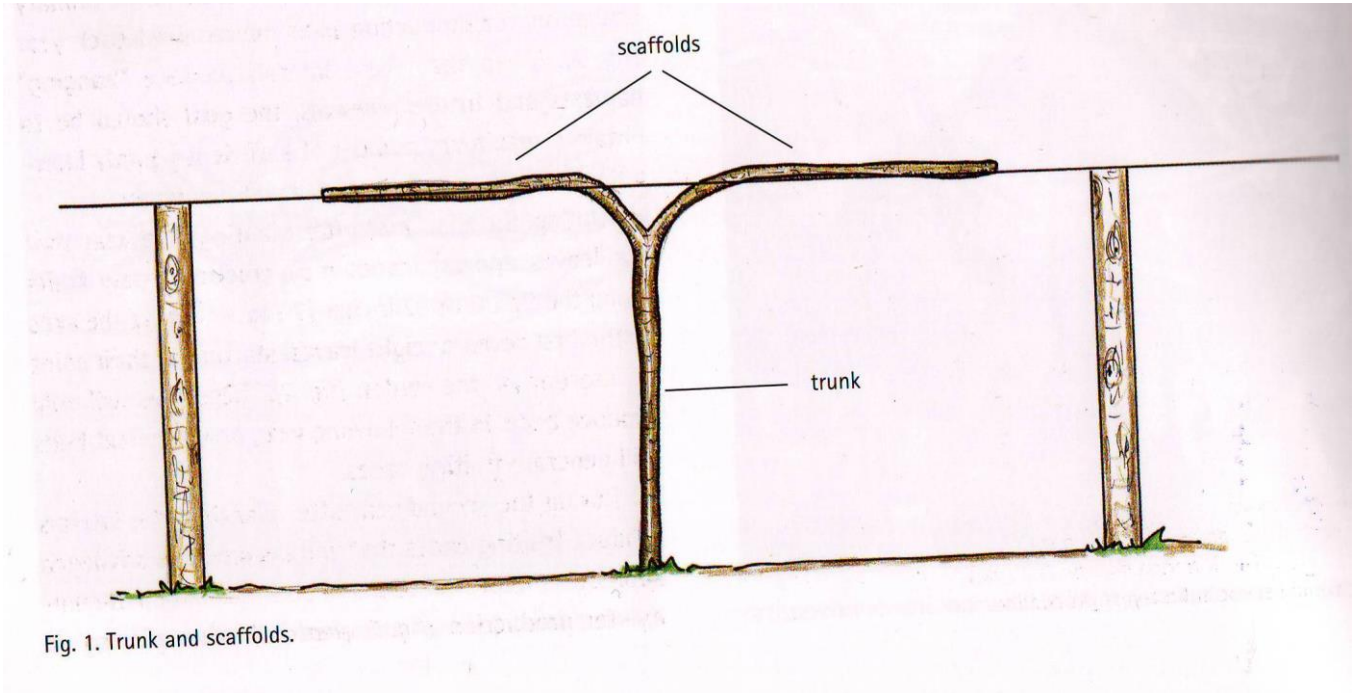


Fig. 1. Trunk and scaffolds.

Vine،

یک تنه حقیقی در حقیقت وجود ندارد؛

شاخه اصلی یک گیاه جوان خیلی زود اطراف قیم را که می‌تواند یک گیاه دیگر باشد می‌پوشانند و به صورت تنه Vine عمل می‌کنند.

Vineدر باغ‌ها مصنوعاً قیم زده شده است

تنه همچون سایر گونه‌های میوه‌ای سیستم انشعاب دهی اصلی درخت است و به همان شکل قطر آن مرتب افزایش می‌یابد.

Cordons

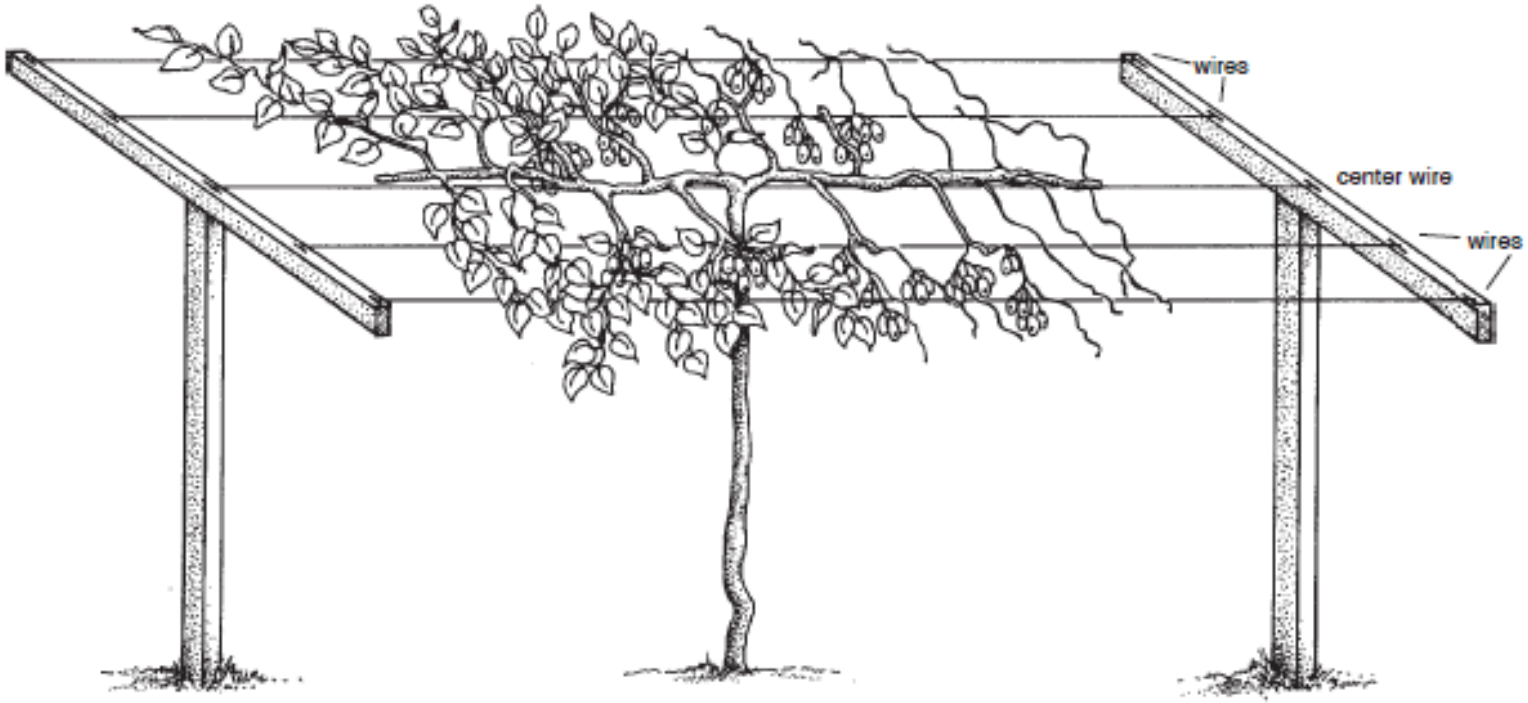
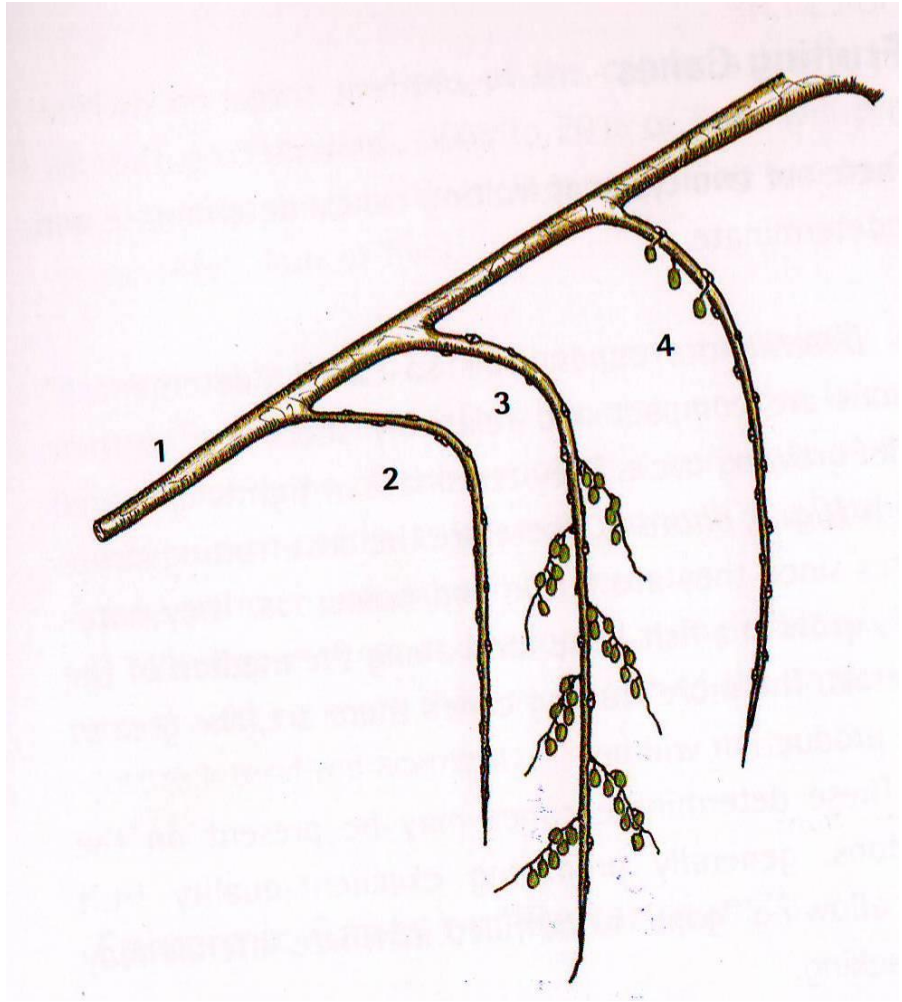


Figure 4.—Kiwifruit vine in third growing season during fruiting. Leaves not shown on right to simplify drawing.

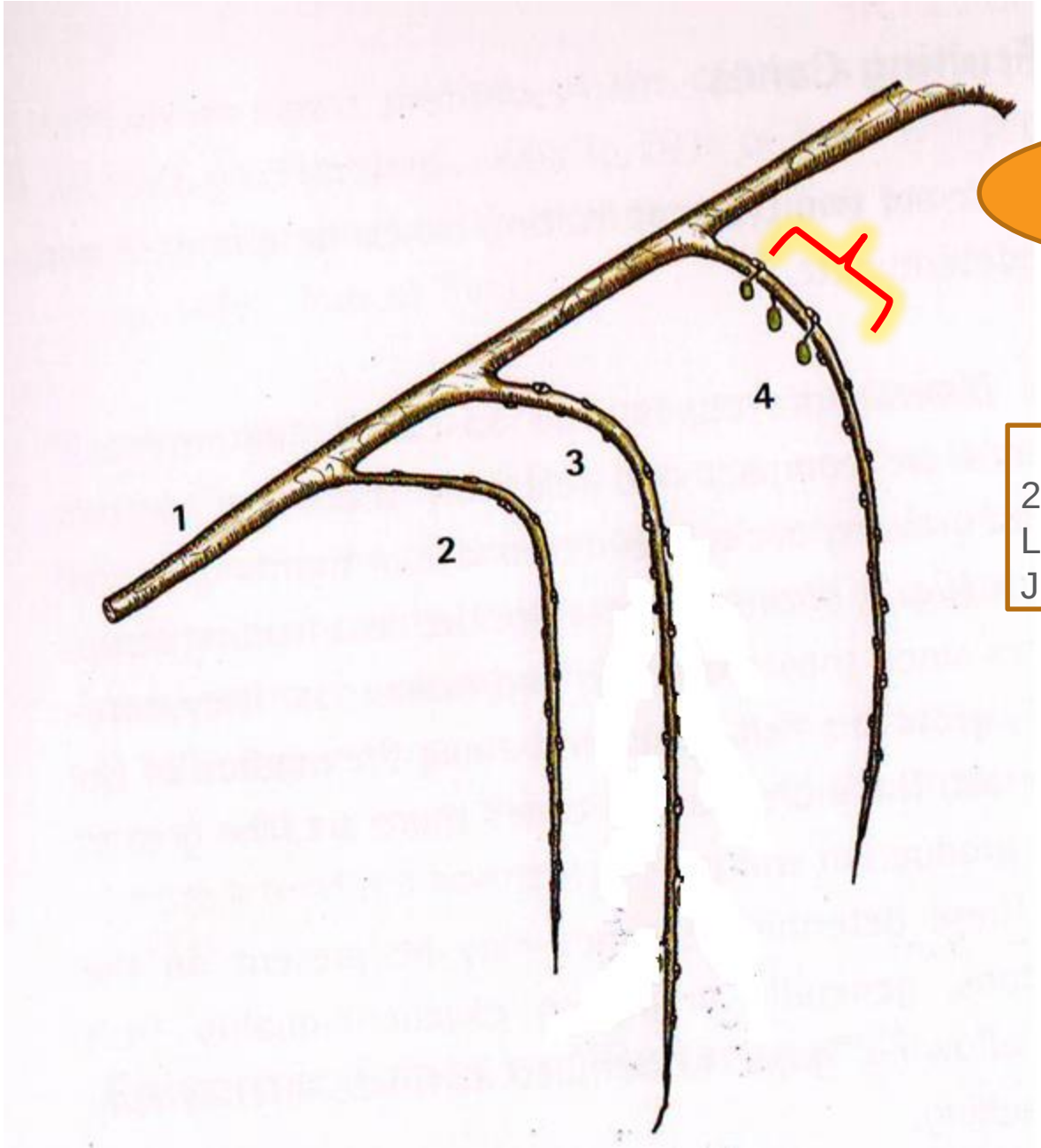
کوردون‌ها در کیوی یا Vineها معادل همان Scaffoldها در درختان هستند. در کیوی کوردون‌ها زمانی شکل می‌گیرند که تنه به دو بازو منشعب شود و هر بازو در امتداد سیم‌های افقی عمود بر تنه رشد کند.

Lateral & Canes



laterals originate from cordons.
Kiwifruit produce a crop on fruiting **laterals** (shoots).
laterals grow from 1-year-old canes (last year's growth).
Laterals must be renewed every year to produce fruits constantly.
Laterals produce hanging shoots (cane) which fruit forms on it.
After pruning maximum cane should be produced.

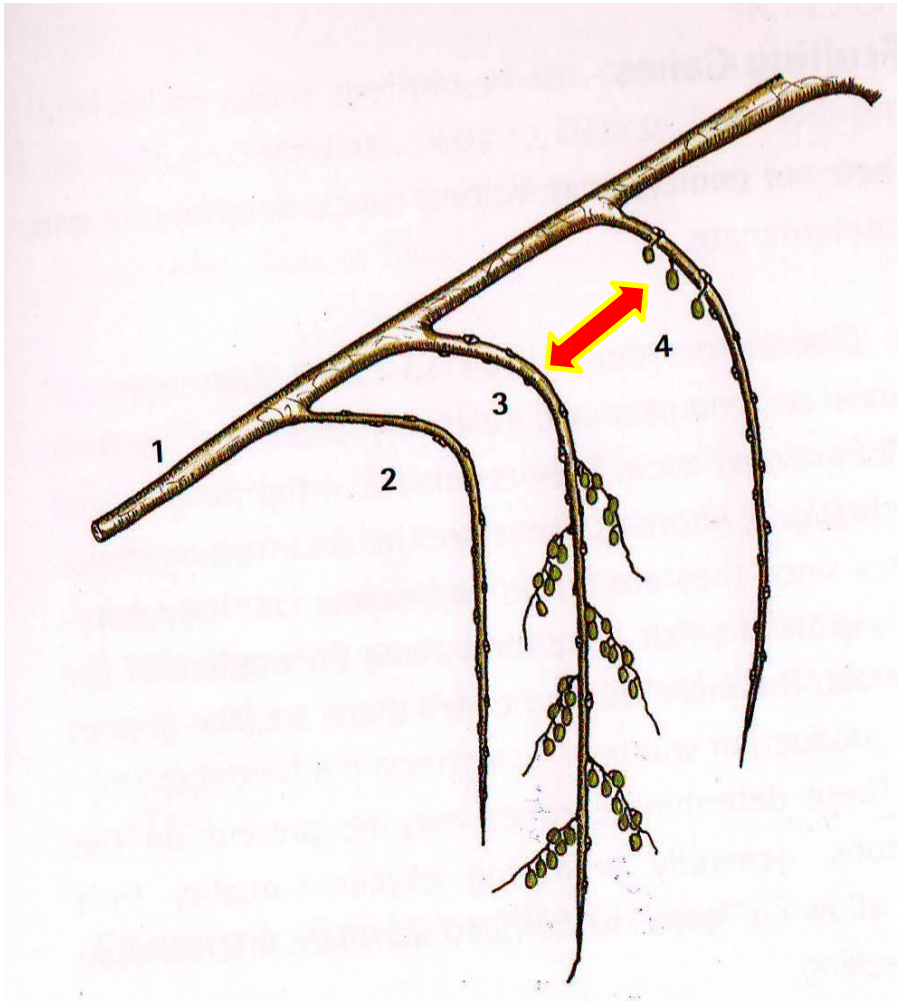
Fig. 2. Laterals.
1: scaffold; 2: annual lateral, no fruit;
3: lateral with flowering shoots (2nd year);
4: annual shoot in first-year production.



1st year after planting

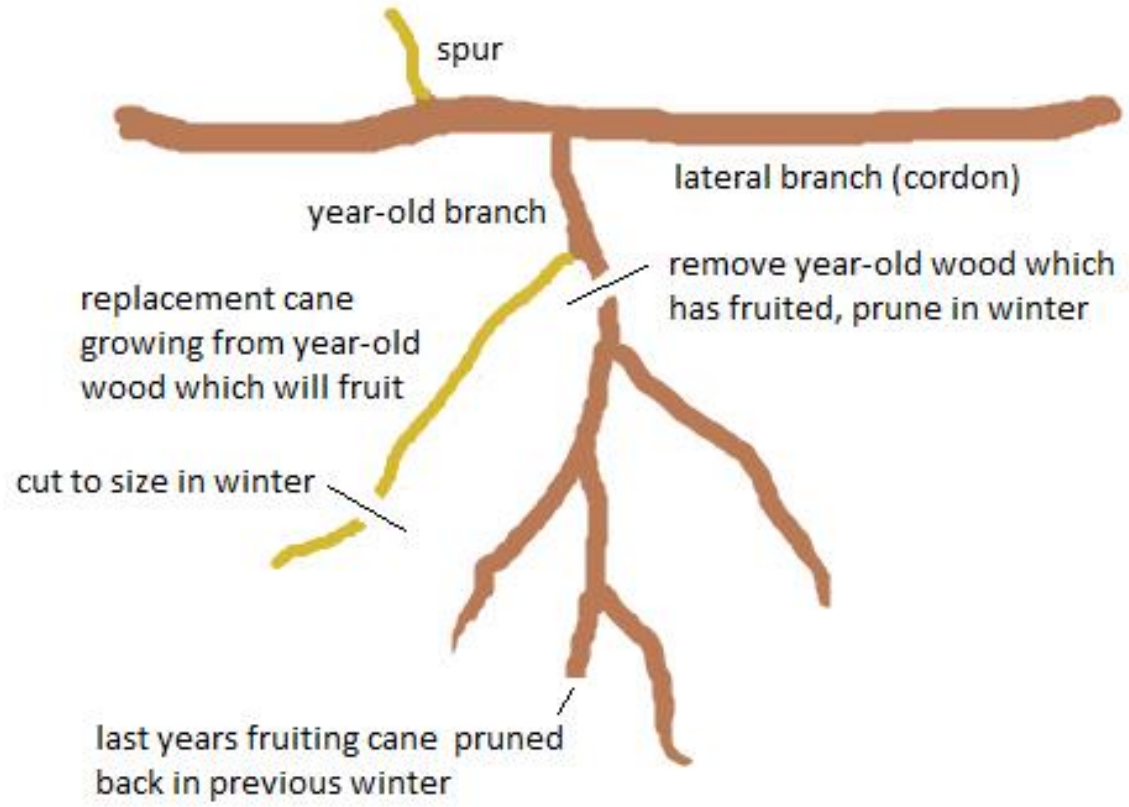
20-30 cm of shoots
Lateral of 7th or 8th leaves
Just once

2nd year after planting



Other buds produce fruiting canes

5. Laterals with their fruiting shoots in 2nd year.



جایگزینی **Lateral**ها با استفاده از**cane**ها و با کمک سیم در زمستان

Caneهای جدید بسته به موقعیتشان بر روی سیم و ظرفیت تولید میوه به**lateral** تبدیل خواهند شد.

Lateralهای جدید
ممکن است مستقیما از
کوردون منشأ بگیرند

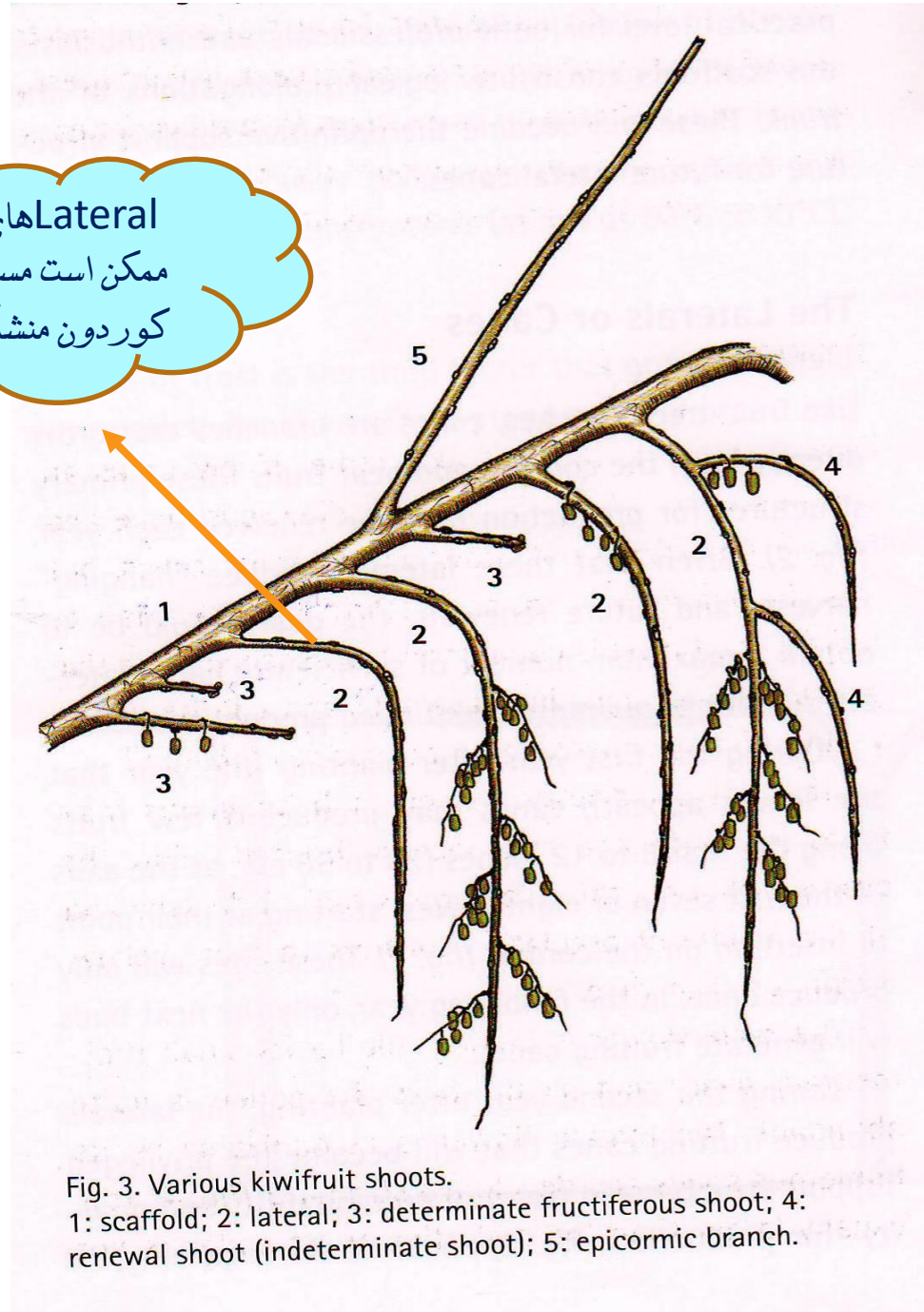


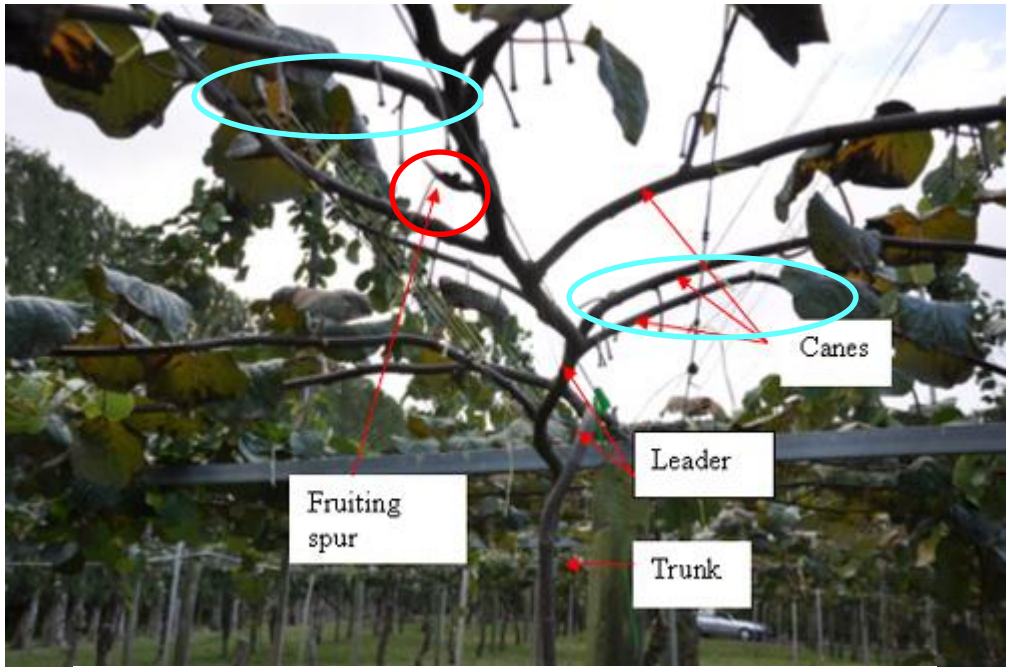
Fig. 3. Various kiwifruit shoots.
1: scaffold; 2: lateral; 3: determinate fructiferous shoot; 4: renewal shoot (indeterminate shoot); 5: epicormic branch.

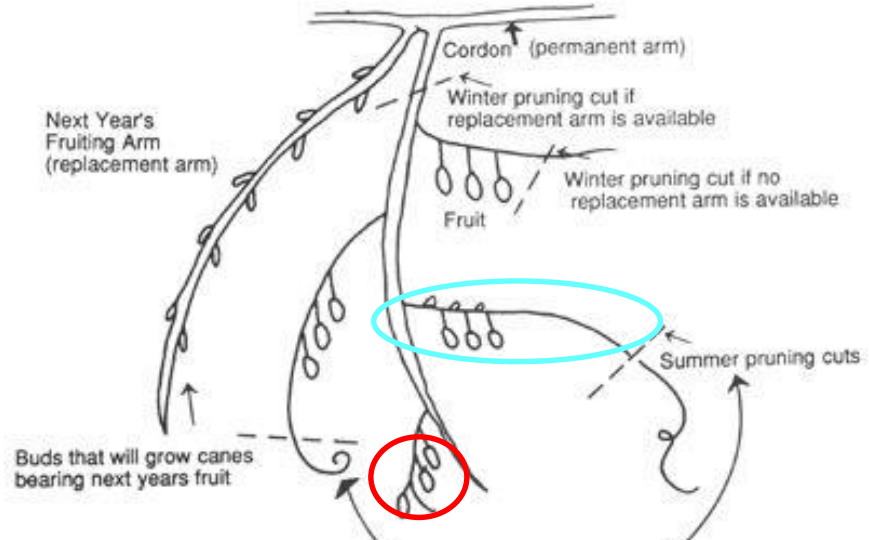
درخت کیوی در تمام سال بر روی **lateral**ها یک سری **Cane** تولید می کند که به **lateral** های جدید تبدیل خواهند شد.

هر**lateral** چرخه زندگی به مدت ۲ سال دارد و بعد جایگزین خواهد شد.

Fruiting Canes

determinate and indeterminate canes





Determinate fructiferous shoot (cane)

فشرده
نسبتا کوتاه ...
جوانه انتهایی خوشه های
بسیار فشرده است
بهترین ساختار بارده
تعداد زیاد ...
الگوی اسکلت ماهی در
امتداد و بین lateralها
با کیفیت ترین میوه ....

6. Determinate flowering shoot.

determinate *vs.* indeterminate canes

cane % 70-50ها: بارده

تعداد میوه روی هر cane: ۲ تا ۶

Mean: 4-5

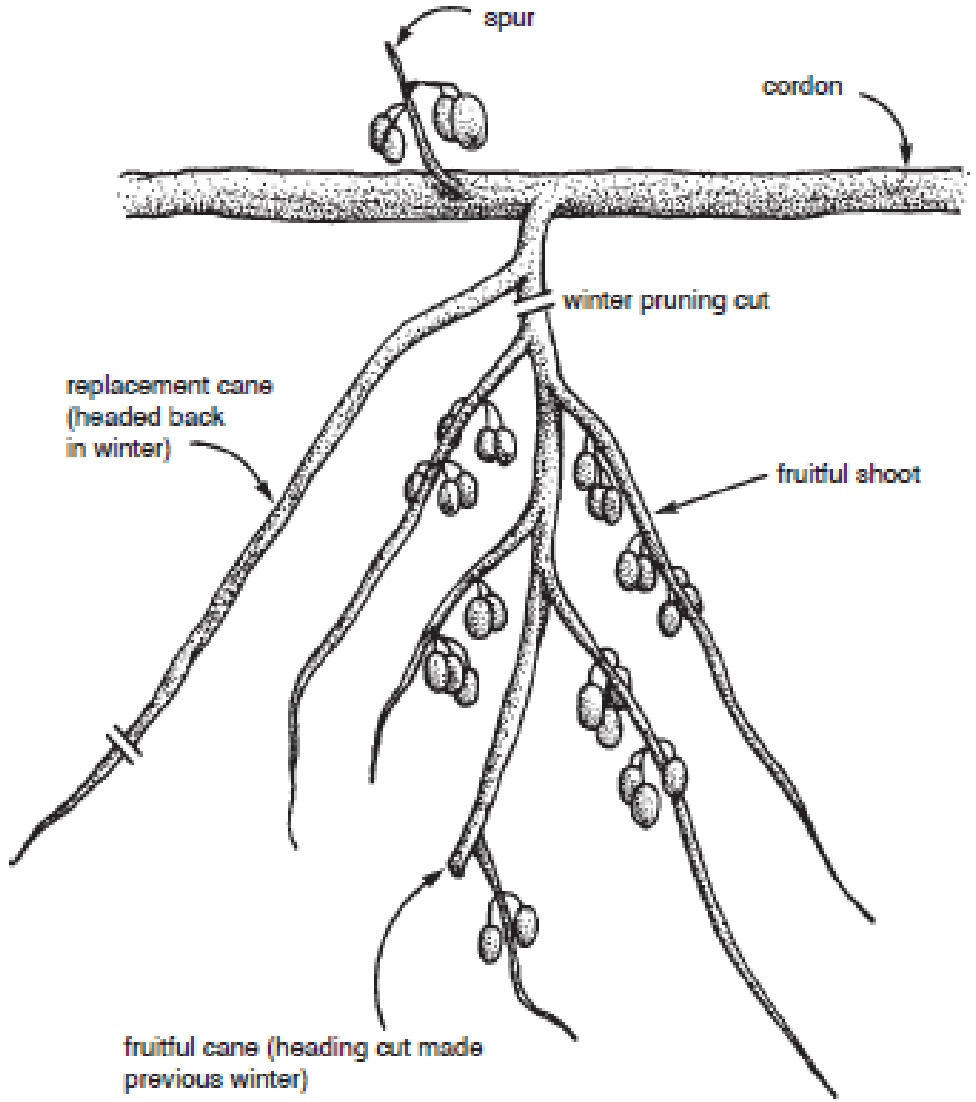


Figure 5.—Mature portion of a kiwifruit cordon in production. Leaves are not drawn to simplify the figure. Fruit are produced on shoots growing from last year's growth. Winter pruning cuts are shown by =.

Indeterminate fructiferous shoot (cane)

رشد مداوم
بر روی lateralتشکیل می شوند
تعداد بر روی lateral: ۰ تا ....
نزدیکترین به کوردون حفظ می شود

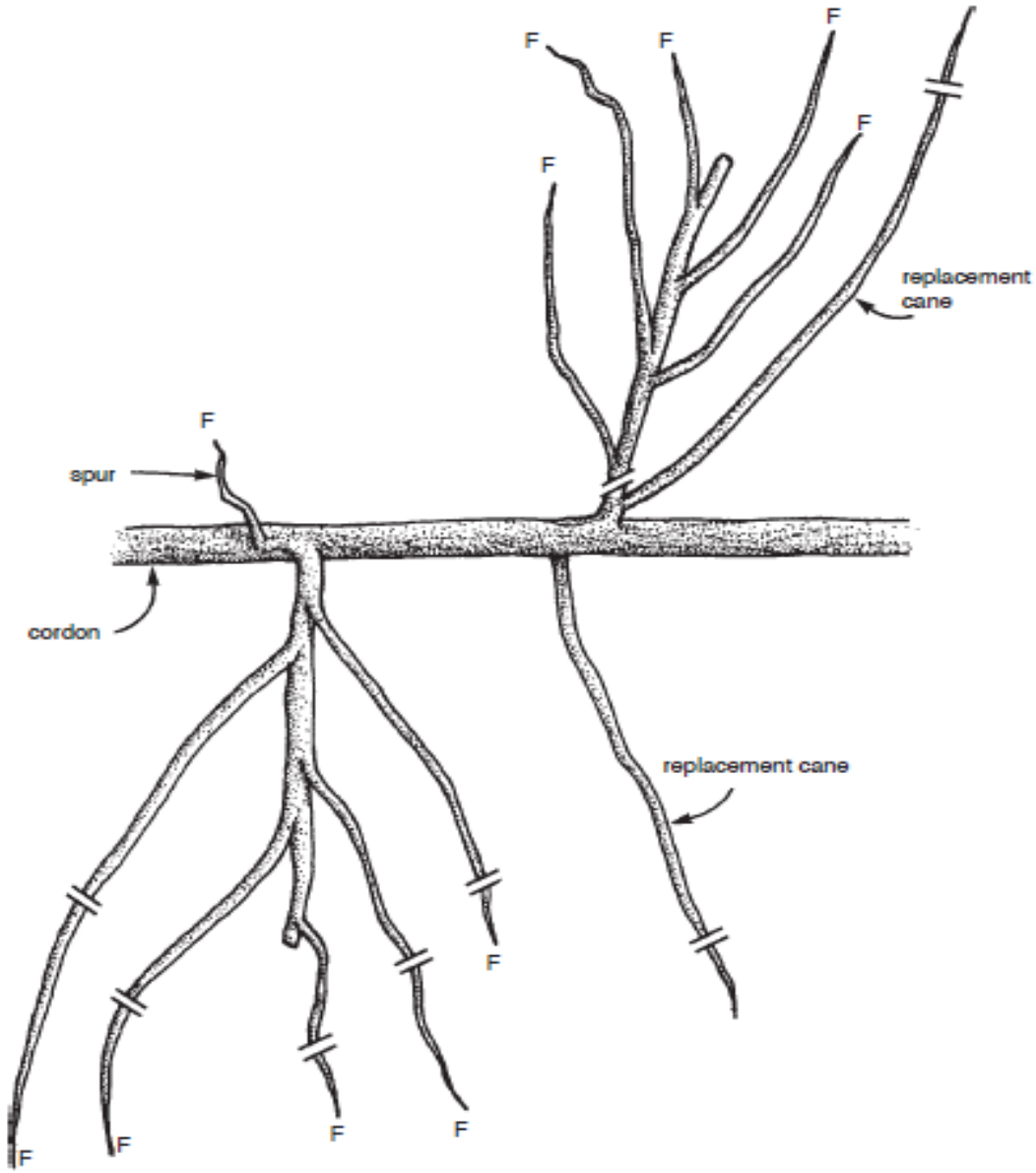


Figure 6.—Dormant portion of a mature kiwifruit vine cordon. Winter pruning cuts are shown by =. Shoots labeled with an "F" fruited last season.

Epicormic canes or Reiterations

- کاملا سخت
- مستقیما از کوردون
- غالبا رشد عمودی
- به سرعت ضخیم می شوند
- به شدت سخت ...

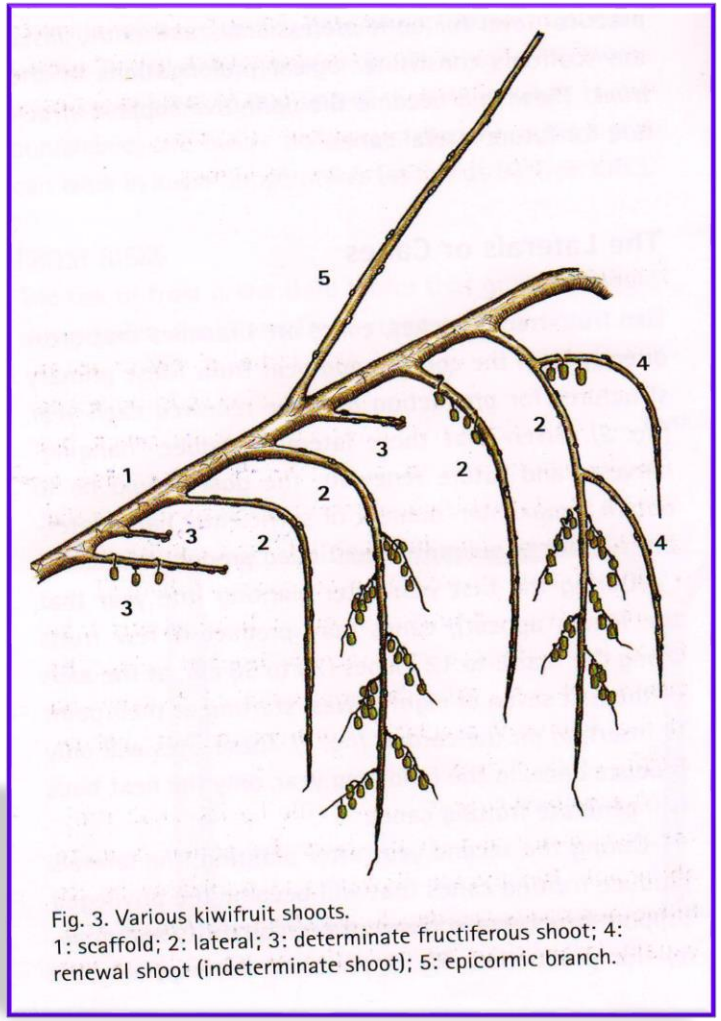


Fig. 3. Various kiwifruit shoots.
1: scaffold; 2: lateral; 3: determinate fructiferous shoot; 4: renewal shoot (indeterminate shoot); 5: epicormic branch.

Flowers

گل‌ها در محور برگ‌ها

به صورت تکی یا گروهی

عمدتاً گل‌های نر و ماده بر روی یک Caneرشد نمی‌کنند ولی (این صفت در همه واریته‌ها صادق نیست).

هم گل نر و هم گل ماده به شکل فنجان cup (cupuliform).

۵ گلبرگ (در هایوارد ۵ تا ۸ گلبرگ)

گلبرگ‌ها می‌تواند سفید، زرد یا صورتی باشد (به گونه بستگی دارد).

گل تعداد زیادی پرچم hypogynous دارد یعنی پریانت و پرچم‌ها زیر تخمدان قرار دارند

میله‌ها بلند و نازک

پرچم‌ها زرد، قهوه‌ای یا بنفش تیره.

7-8. Floral buds and flowers.

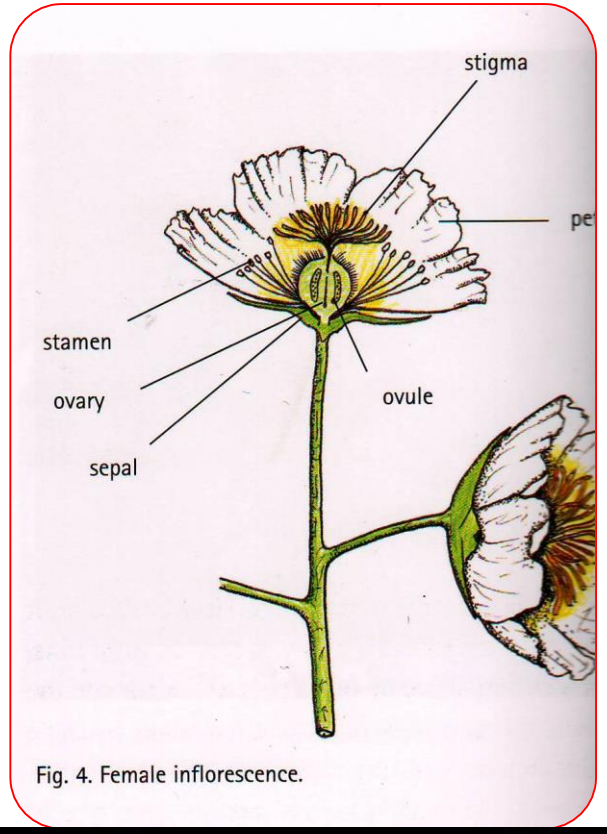


Fig. 4. Female inflorescence.

گل‌های نر با تخمدان کوچک توسعه نیافته و خامه‌های کوتاه قابل تشخیص هستند.

تعداد دانه‌های گرده بسیار زیاد است.

گل‌های ماده نیز با تعداد خامه زیاد و کلاله-های کاملاً توسعه یافته قابل شناسایی است.

معمولاً گل‌های ماده بزرگتر از گل‌های نر هستند و دانه‌های گرده در آنها زنده نیست.

پرچم در گل‌های ماده میله بسیار کوتاه و بساک‌های کوچک دارد.

بر خلاف سایر درختان میوه خزاندار که در آنها گل انگیزی در تابستان قبل از گلدهی اتفاق می‌افتد، گل انگیزی در کیوی در مدت تنها چند هفته قبل از گلدهی اتفاق می‌افتد (تقریباً شبیه زیتون و برخی از مرکبات). بنابراین ....

Pollination

- For a good yield of fruit, one male vine for every three to eight female vines is required.
- Kiwifruit is notoriously difficult to pollinate, because the flowers are not very attractive to bees.
- Generally, the most successful approach, though, is saturation pollination, where the bee populations are made so large (by placing hives in the orchards at a concentration of about 8 hives per hectare) that bees are forced to use this flower because of intense competition for all flowers within flight distance.

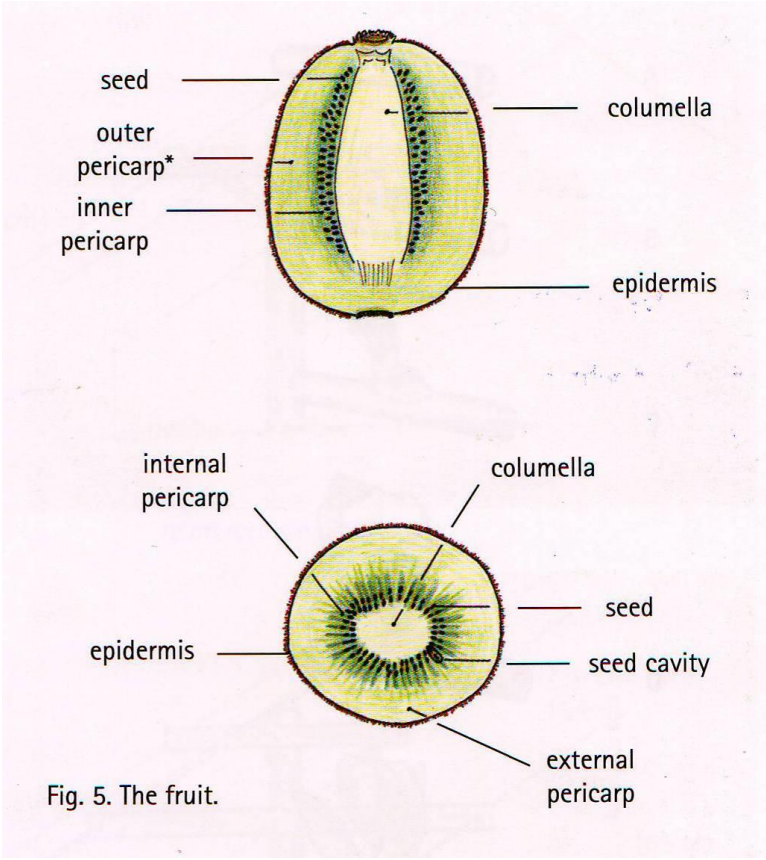


Fig. 5. The fruit.

میوه در A.deliciosa به رنگ قهوه‌ای (رنگ کرک‌ها)،

به فرم سته با تعداد زیاد بذر سیاه کوچک.

بسته به رقم، شکل، اندازه و سختی میوه تفاوت‌های قابل توجهی دارد.

رنگ سبز روشن گوشت به خاطر وجود کلروفیل است.

گوشت میوه در گونه Deliciosa سبز روشن است، در گونه‌های Chinensis، رنگ گوشت می‌تواند از زرد تا سبز تیره باشد.

گوشت میوه کیوی یک ستون مرکزی طولی به نام Collumella را احاطه کرده که به رنگ سفید، سبز یا کرمی است.

بذرها در دو ردیف این ستون را احاطه کرده‌اند.

قسمت خوراکی میوه شامل pulp، columella و بذرهاست.

هر میوه A.deliciosa ممکن است تا ۱۴۰۰ بذر داشه باشد، به حداقل ۸۰۰ بذر (در بهینه ۱۱۰۰) برای دستیابی به وزن ایدآل میوه (حدود ۱۰۰ گرم) نیاز است.

میوه بدون دم برداشت می‌شود و دم میوه در زمان برداشت بر روی جوانه باقی می‌ماند.

- **Annual Plant Cycle**

- Winter dormancy
- Bud break (از نیمه اسفند تا فروردین)
- Cane growth (اردیبهشت–انتهای فروردین)
- Male blossoms (اردیبهشت)
- Female (خرداد)

Blossoming در هایوارد برای حدود ۹ روز طول می‌کشد.

- Fruit set (نیمه خرداد حدود ده روز)
- Harvest (آبان)

Harvesting and postharvest management

- It takes 4-5 years for a kiwi vine to start bearing worthwhile fruits and 7-8 years for commercial production.
- The harvesting period varies from area to area.
- The fruits mature earlier at the lower altitude and later at higher altitudes because of variation in temperature.
- Under Solan conditions, the fruits can be harvested from October end to third week of November depending upon cultivars, whereas under Shimla condition, the fruits are harvested from last week of November to December.
- Kiwi fruits having 6.2% TSS are ideal for harvesting. But delay in harvesting deteriorates their storability.

- They are easily harvested by snapping off the fruit at the abscission layer at the base of the stalk.
- At least two pickings are made.
- Larger sized berries should be harvested first while smaller ones should be allowed to increase in size and improve in quality.
- After harvesting, the fruits are rubbed with a coarse cloth to remove stiff hairs found on their surface.
- Hard fruits are transported to the market. Subsequently, they lose their firmness in two weeks at room temperature and become edible.
- On an average, kiwi yield varies from 50 to 100 kg fruits/ vine.
- Vines on trellis produce about 25 tons/ ha after seven years.

Climate

- Kiwi is a deciduous vine which can withstand wide climatic conditions.
- However, for high yield quality fruits, it requires 700-800 chilling hours below 7 ^{0}C to break its rest period in the winter otherwise the bud break may be delayed.

It may be damaged by:-

(I) Autumn frost on the crop and the non dormant plant from October end to November end

(II) Frost at the end of the winter before and during the budburst **(-15 to -18: wood)**

(III) Spring frost after budburst. **(-1.5 to -3: open buds; -1: fruits; 0 C: flowers)**

- In summer, high temperature (> 35 ^{0}C) accompanied by high insulation and low humidity may cause scorching of leaves.

  In India, kiwi can successfully be grown at 800 -1,500 m above mean sea level.
- A rainfall of about 150 cm/ year is sufficient.

Until the age of four, it is strongly recommended that trunks be protected during the winter. That protection may be removed at the beginning of April.

Soil

- It can be grown on a wide range of soils but deep, rich, well drained sandy loam soils are ideal.
- A soil pH slightly less than 6.9 results in maximum yield but higher pH up to 7.3 affects adversely because of Mn deficiency.

Soils that are rich in clay will lead to insufficient growth and become a factor in deficiency.

Irrigation

The kiwi's water requirement are rather high.

- Kiwi plants require much water due to their vigorous vegetative growth, leaf size, vine habit and high humidity in their natural habitat.
- Therefore, it cannot be successfully grown in rain fed areas.
- Moisture stress during summer adversely affects fruit size and crop returns, therefore summer irrigation is essential to cope up with growing period of fruit.
- Irrigation is also needed during September and October when the fruit is in initial stage for growing and development.
- Irrigation at 10-15 days interval is quite satisfactory for good economic returns.

As a general rule the plants should receive at least 120 to 155 mm of water per month **regularly**- in the month of June, July, August and September. If the soil is dense, you can lower those by 20 to 25%.

- Avoid asphyxiating areas
- The roots need a lot of air
- The ideal soil is one that dries rapidly (alluvial soils)
- Provide an organic substratum in a sufficiently large planting hole, and always on a hill
- Excess water can promote not only root asphyxiation but also the appearance of *Phytophtora cactorum* (attacks the stem and roots, causing the plant to die).

Because the kiwifruit loves “subtropical” climate, humidity levels are a primary factor in the development of its leaf system.

wind

- Wind is one of the worst enemies of the kiwi.
- Windy areas are absolutely to be avoided.
- Plant growth will come to a standstill, and leaves will show considerable wilting (necrosis and leaf drying).
- Lateral stems or renewal sprouts may tear off.
- Kiwifruit should be planted with as much protection from the wind as possible or positioned near a natural windbreak. (proper light porosity and sufficient ventilation)
- Windless regions have higher RH.

✓ Wind is both an aid and a hindrance in terms of kiwifruit **pollination.** Kiwifruit pollen is dried by the wind and does not stick to the flower, thus allowing insects to carry it. Numerous trials have shown that bees seem essential for obtaining a sufficient number of seed in the fruit.

Planting

- Land having very gentle slope is ideal for it.
- If possible its rows should be oriented in a north south direction to avail maximum sunlight.
- Preparation of pits, mixing of farmyard manure and filling of pits should be completed by December.
- In T-bar, a spacing or 4m from row to row and 5-6 m from plant to plant is common, whereas in pergola system, a spacing of 6 m from row to row should be maintained.
- January is ideal time for planting.
- The soil should be firmly placed around the roots.
- Chinese gooseberry is a dioecious plant; therefore, interplanting of male plants is essential for fruit production.
- Adequate pollination is essential for the development of good sized fruit while poor pollination may limit productivity.
- In India, only 2 male clones-Tomuri and Allison are generally interplanted.
- Planting male and female plants in a 1:9 ratio is common.

Propagation

Hard wood cutting

- Hard wood cuttings are prepared during the dormant season (January-February) from the previous year summer growth.
- Well matured dormant shoots are used for cutting having at least three healthy bold buds from middle of the shoot.
- Tips of the shoots should be avoided as they give a very low rate of rooting.
- The cuttings of the central and basal parts are ideal.
- Cuttings having more number of spurs should not be selected.
- The cuttings are treated with IBA (500 ppm) for 10 seconds and set deeply in moist rooting medium.
- To prevent the cuttings from desiccation and rotting the top portion of the cuttings are waxed.
- A rooting medium consisting of farmyard manure: sand: leaf compost: soil in the ratio of 1:1:1:1 results in highest rooting in open conditions.
- Irrigations are given frequently.
- Adequate drainage should be provided to keep the nursery bed weed free.

Soft wood cuttings generally root easier and quicker than hard wood cuttings but they require more attention and sophisticated propagating structure (mist chamber).

Semi hard wood cutting

- Semi hard wood cutting with 3 buds and 0.5 – 1.0 cm in thickness from the middle portion of the current season's growth are taken in July.
- A wound of about 1 cm length is made on one side of the base just below the node.
- Lower leaf on the basal bud are removed while two leaves are retained but reduced to 20- 50 % by a circular cut maintaining the natural leaf shape.
- The cuttings are treated with sand as the rooting media.
- Intermittent mist should be applied at 10 min. interval.
- In this method 70 -75 successes is achieved.

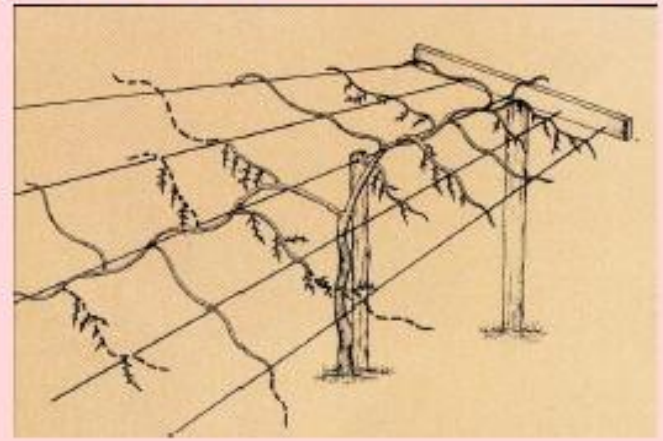
Grafting

- Kiwi plants are also propagated by grafting.
- Though it takes almost two years to develop a nursery plant through grafting or budding onto the seedlings but this method is easiest and most economical.
- The kiwi plants can be raised through tongue grafting of kiwi seedlings during January- February.

Budding

- Seedlings become ready for budding normally at the end of first growing season when the stem diameter is about 6-8 mm.
- One or two buds are inserted on the main stem by T budding method at 10 cm above the ground level.
- Chip budding during mid February results in bud take as high as 95%.
- The bud is firmly secured into position by tagging with a polythene tape.
- When the bud has taken, the top or the vine is cut above the union during the following dormant season.
- The protection to the young growing shoot from the bud is very important because it is very brittle and easily breaks.

Proper Pruning and Training is Required for Fruit Production!



- Annual winter pruning to remove 60% - 85% of the vine is required!
- Fruit is produced on fruiting spurs which occur on laterals which are at least two years old.
- A permanent scaffold branching system is developed which is made up of vine leaders and laterals.

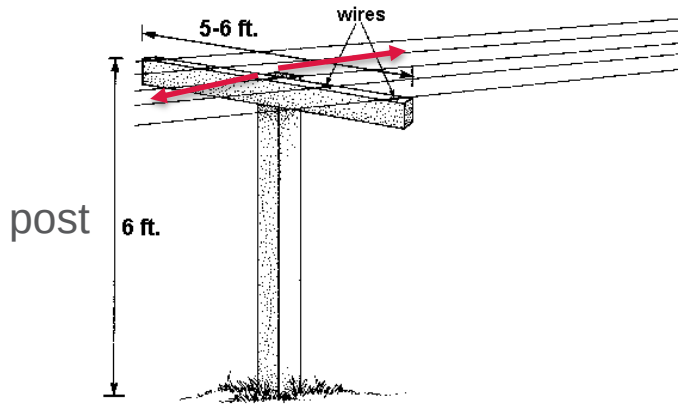
Trellis Systems

- Kiwifruit need a strong trellis and require a significant amount of pruning. They may be grown on an overhead arbor (pergola) or on a T-bar trellis.

- Two main types of support structures or trellises are used in commercial kiwifruit production: the T-bar and the pergola. A pergola provides a single plane of canopy about 6 feet above the ground. The T-bar trellis system consists of posts in rows with a cross arm at 6 feet high.

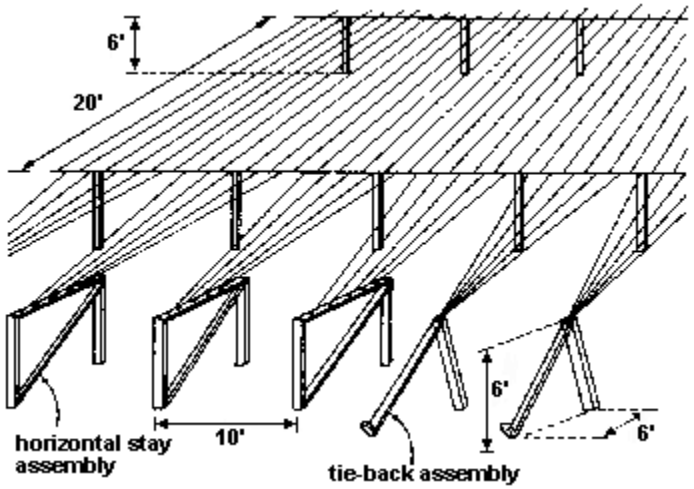
T-bar

A typical T-bar trellis consists of posts with a 5- to 6-foot (depending on row width) long cross arm extending across the post. The kiwivine fruiting canes are tied to wires on top of the cross arm.



Pergola

A pergola trellis is designed to support a solid canopy of foliage and fruit. Wires not only extend down the row, but also are used as “cross arms” (more commonly than using wood) running perpendicular to the vine rows. The wires are placed 1 to 3 feet apart.



kiwifruit pergola vs. T-bar trellis

T-bars are less expensive to construct, less labor intensive, better suited to bee pollination, and they reduce the risk of botrytis infection. However, pergola systems tend to produce more yield per acre and the fruit are less susceptible to wind damage. Also, once the full canopy is established in a pergola, the shade reduces weed growth.

(A) Training:-

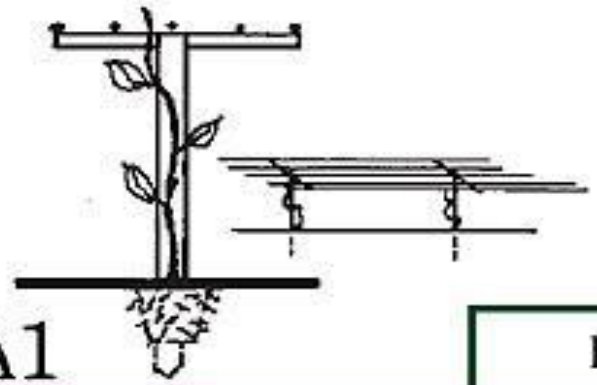
- T- bar trellis and pergola systems.
- In T- bar trellis system, the pillars of iron and concrete about 1.8m in height above the ground level are erected at a distance of 6m from each other in a row in straight line.
- A cross arm (1.5m) is fixed on each pole, which carries five outriggers wire at a distance of 45 cm each

- Vines are trained upto wire as single stem then two leaders in opposite direction along the center wire are selected or developed .
- From these permanent leaders, temporary fruiting arms 25-30 cm apart are selected at right angle along both sides of each leader.
- Training of vines on pergola system is similar to that of T-bar. A flat topped network of criss-cross wire is prepared on the erected pillars.
- This systems is costly to prepare but vine trained on this system gives higher yields.

Plate 4.T Bar trellis system

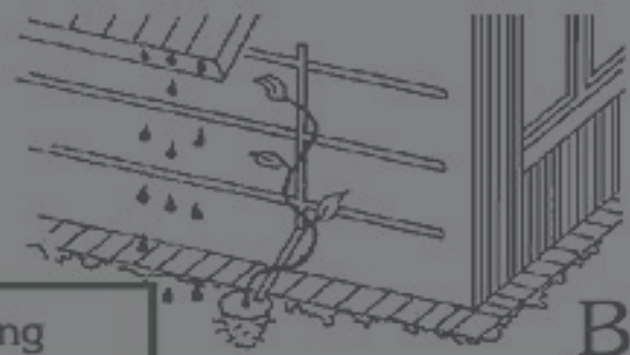
A Training on a T-shaped trellis

B Training against a vertical support (e.g. a wall)

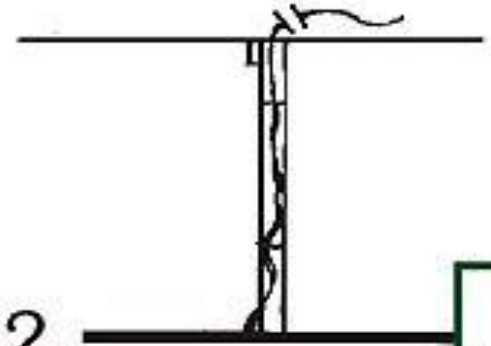


A1

Planting

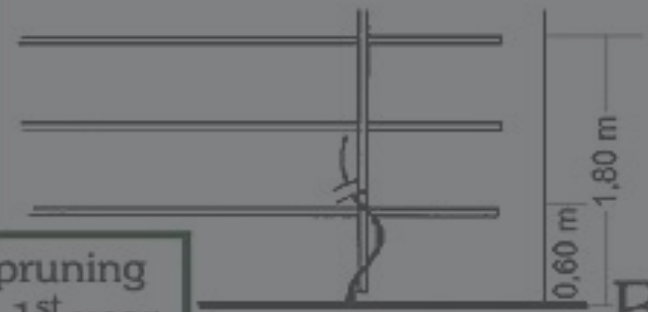


B1

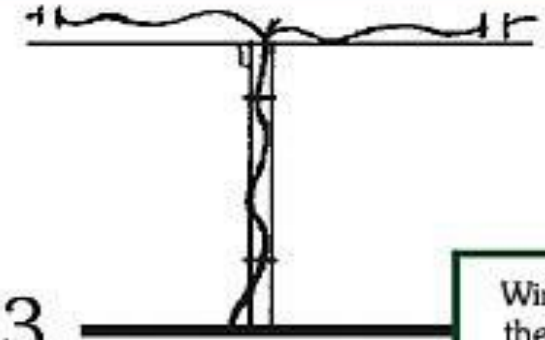


A2

Winter pruning after the 1st year

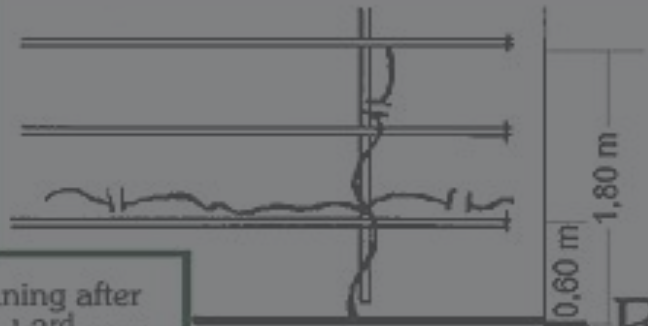


B2

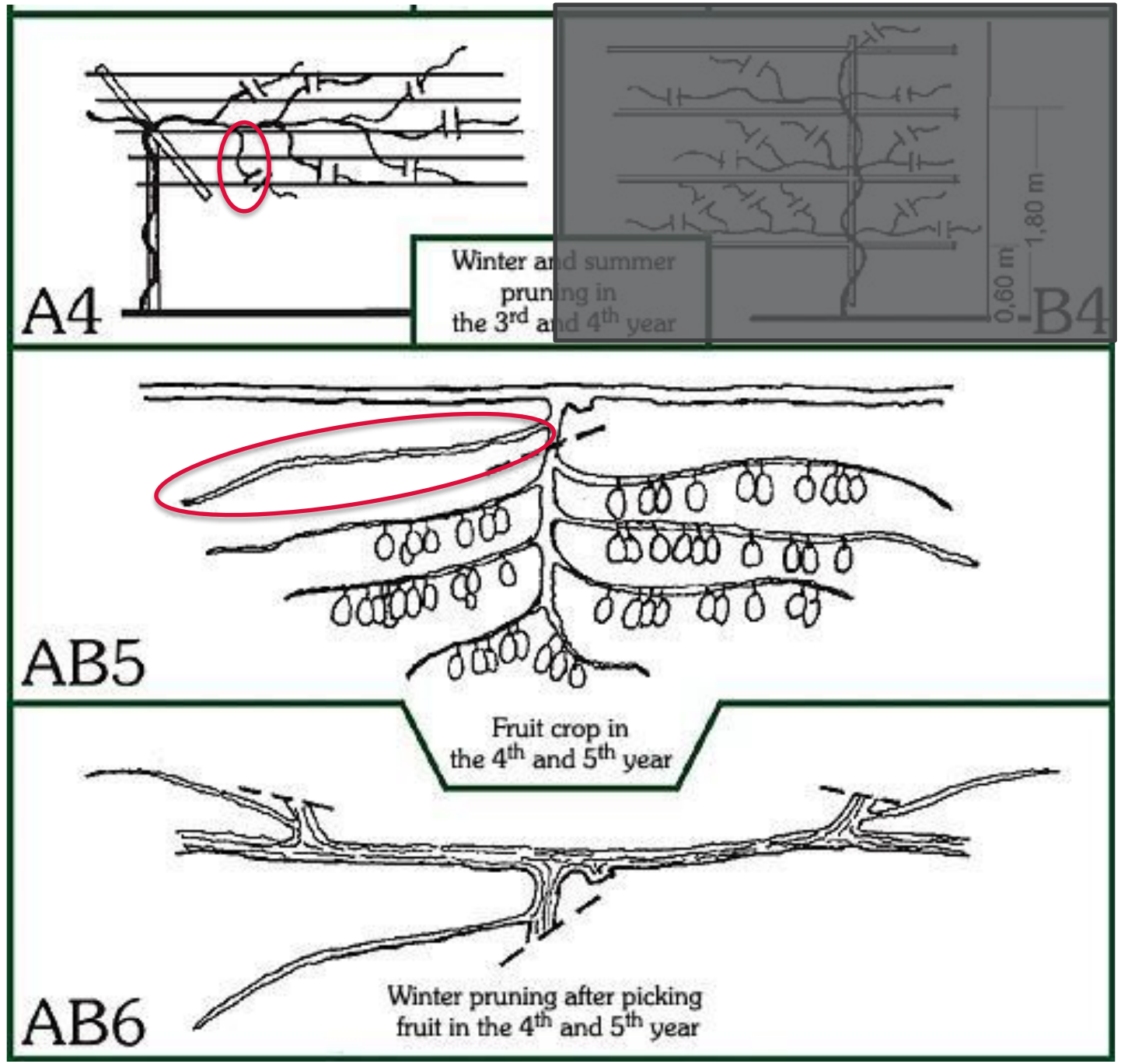


A3

Winter pruning after the 2nd and 3rd year



B3


A4
Winter and summer pruning in the 3rd and 4th year
0,60 m
1,80 m
B4
AB5
Fruit crop in the 4th and 5th year
AB6
Winter pruning after picking fruit in the 4th and 5th year

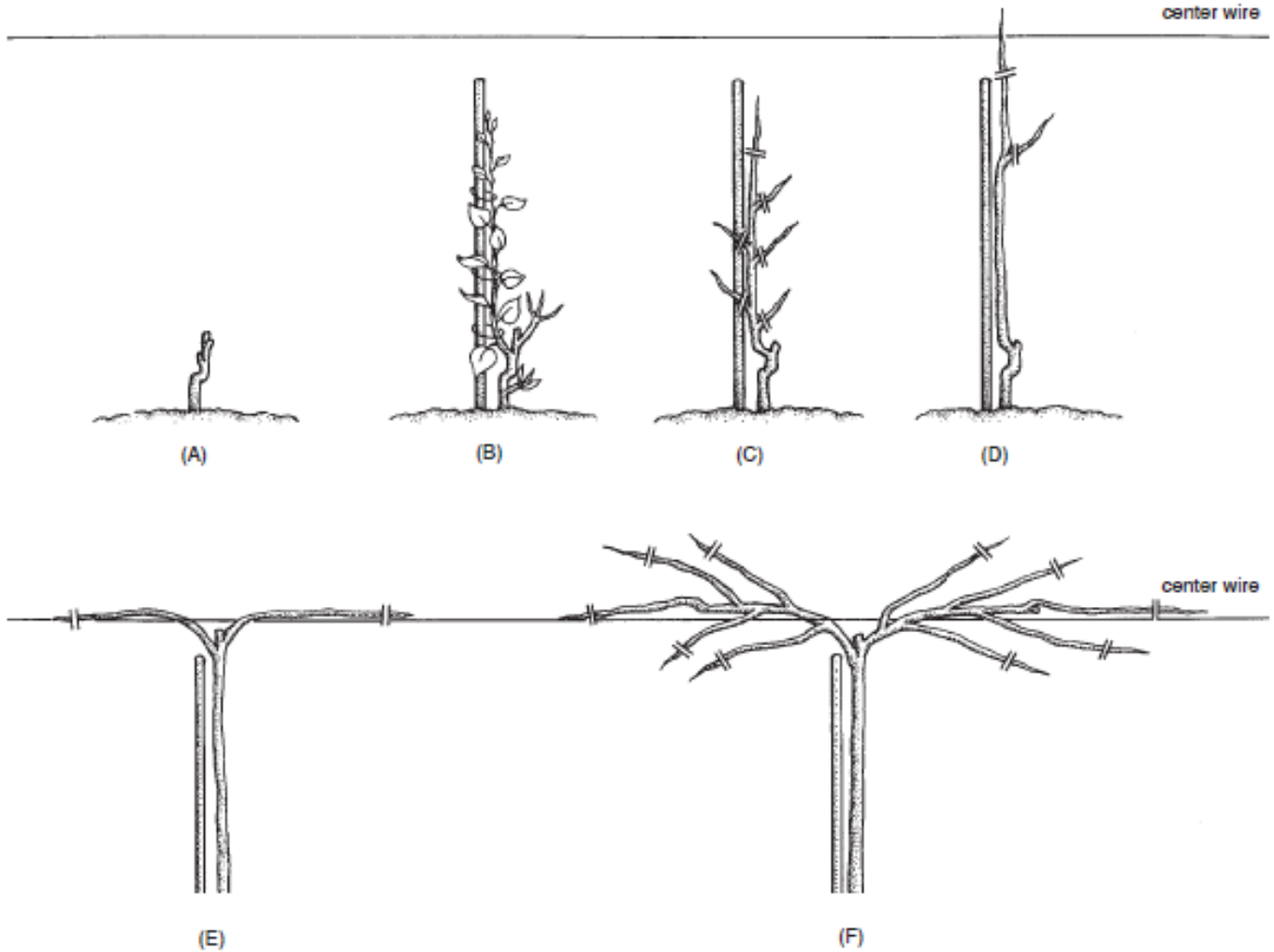


Figure 3.—Training a young kiwifruit vine. Pruning cuts are shown by =.
(A) Prune to one or two buds at planting.
(B) Train one shoot as trunk; remove all others (Year 1).
(C) Head back trunk as shoot growth at terminal loses vigor.
(D) Continue to remove lateral shoots; let trunk grow beyond wire. Then head to just below wire.
(E) Choose two shoots to form cordons, one each way on wire. Head back to ¼-inch-diameter wood in dormant season (Year 1).
(F) Shows shoot growth Year 2. Pruning cuts in dormant season Year 2 are shown.

Experimental trial (Zespri®) with Hort16A orchard covered under anti-rain nets:

Thinning the Fruit

- There are two periods when thinning the kiwifruit is necessary: **pre-floral thinning** (late April to early May until May 15), and **post-floral**, from June 10 to about July 10.

- Suppressing the floral buds is more quantitative than qualitative.
- When the number of **inflorescences** are numerous, you should remove lateral buds and keep only the central, dominant buds.
- You should also remove deformed (double or flat) buds from the base of a lateral or cane.
- The occurrence of fused flowers- a common phenomenon in kiwi- gives rise to large, **flattened fruits called "fans",** which are defective for commercial.
- It should be enough to keep about four fruits per fruiting cane.

- Thinning small fruits is more qualitative than quantitative.
- You should remove the forgotten fruit, deformed fruits (double or flat), poorly pollinated fruit (round fruit), and any fruit with surface abrasion.

The aim of bud thinning is to reduce the number of buds prior to pollination by removing side buds and flat buds. This is because if the fruit is overcrowded, it will cause damage because each fruit couldn't get enough nutrients to grow into the desired size. Hence, we have to be extremely wary to the buds above our head, scanned them cautiously to find the three-buds or the flat buds, which looks like a kidney bean. Also, we can only pick the bud from a female tree.

The perfect bud

The three-buds, which we have to eliminate the two side buds

The kidney-bean-bud

- Calculating an optimal load density

- 23 laterals per vine
- 15 bud on average per lateral branch
- Budbreak of 60% of the buds (9 per lateral)
- 3.5 fruits per fruiting cane
- Average fruit weight: 100g

$23 \times 9 \times 3.5 = 725$ fruits per vine or 72.5 kilos