

FUTURE ORCHARDS 2012 NOVEMBER 2007 ORCHARD WALK

30 YEARS OF INTENSIVE ORCHARD PRODUCTION IN SOUTH TYROL

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South Tyrol

The South Tyrol produces around 900.000 tons of apples every year, this is nearly 50 % of the total Italian apple production. About 5.000 Apple Growers are working on 15.700 hectares which represents an average of 3.14ha per orchard. Despite the small farm size, in this region the apple production has an important economic value. For more than 100 years in the Etsch valley the farmers were producing and marketing apples and wine.

Until 1950 the area was dominated by big apple trees on seedling. From 1960 and later the fruit production changed rapidly. After the seedlings, for a time the Palmetten“ training on Malling 7 and 106 was popular. From 1970 some pioneers and the Extension Service introduced the Malling Dwarfing rootstocks, M9 and M26. Especially in some new growing areas, as the Vinschgau Valley the apple production with the M9 rootstock was expanding very rapidly.

After some doubts at the beginning, most of the growers saw the advantages of the M9 rootstock: the production and fruit quality was increasing (Grafik)

KEY SUCCESS FACTORS FOR THE FRUIT PRODUCTION IN SOUTH TYROL

Content:

- 1) The ideal young tree
- 2) Training and pruning
- 3) Crop regulation
- 4) Problems to avoid
- 5) Future development

The ideal young tree

- The rootstock and the scion wood
- The external tree quality
- The internal tree quality
- Conclusions

The Malling 9 rootstocks can be divided in 3 important types: Juvenile, adults, and transitional types.

The most important juvenile types of M9 are: Nikolai 29, Pajam 2 and Fleuren 56. They have good root development, serrated leaves, but have the tendency to make more burrknots.

The adult types are: Nak-B T338, Pajam 1 and EMLA; they have poor root development, unserrated leaves and have only a few burrknots.

Between these two are the transitional types for example NAK-b T337, Burgmer 1 and Fleuren 59.

These M9 rootstocks have the following characteristics:

Pajam 2 or EMLA are the most vigorous of all M9 Types. They grow 15-20 % more than T337, Nicolai 29 is growing 5-15 % more than T337. Pajam 1 is growing nearly the same as T337, and Fleuren 56 is a little weaker. Concerning the productivity and the fruit quality there are no significant differences.

In South Tyrol, the rootstock M9 T337 is the most used one. For varieties, which have less vigour such as Pinova or Gala, we advise to use also Pajam 2 or Nic. 29

The more vigorous rootstocks, M26 or Supporter 4 are used only for Red Delicious Spur Types.

A smooth rootstock is an important demand. Many burrknots cause (create) less vigour and in our climate such trees are more sensitive to winter frost damage. Different trials are showing, that Pajam 2 and Nicolai 29 have more rootsuckers. The rootstock M26 is creating more burrknots with the consequence of irregular vigour.

Conclusion:

For **Non Spurtypes**, M9 is the standard rootstock in South Tyrol. The various M9 clones differ especially in their vigour and in the tendency to create burrknots and root suckers. Depending from the soil type and variety, choose the M9 clone that is most suitable. The ideal bud union height should be 20 – 25 cm above ground level. Use only smooth rootstocks.

For **Spurtypes** M9 should be used only in (under) the best soil conditions. For Spurtypes are predestinated especially the stronger clones as Pajam2, EMLA or Nic 29. For M26 should be used only smooth rootstocks. A possible alternative instead of M26 is the rootstock Supporter 4. The first experiences with this rootstock are:

The vigour is nearly to M26, but less burrknots and a few rootsuckers. Generally the bud union height should not be more than 10 to 15 cm.

External quality: **Knip tree**

The advantages are that trees are well feathered, the side branches have an ideal height (80-90 cm) and trees normally have a wide crotch angle, with the result that less bending work is necessary. The trees are more expensive, because trees are two years old. A disadvantage is often the weak basal branches.

One Year old tree

The advantages are the stronger basal branches and the convenient price. The trees require more work, because the crotch angle normally is steeper than with knip trees. Different trials, made in the Netherlands are showing that yields in the first 5 years are always higher using knip trees.

9-Month-trees

Are grafted in winter or spring, the canopy of the trees will be developed in one season. Normally these trees develop only a few feathers. The basal branches are often too low. The crotch angles are steep, therefore intensive labour is necessary. The tree quality is very variable and seldom uniform. The advantage is the convenient price and new varieties and strains are promptly available.

Tree quality and returns:

One example from a trial, made at the research station, Zeewolde done by J.H. Bootsma 1991:

Planting distance 3 by 1,3 m

Conditions:

tree price for unfeathered trees 3,20 €

Tree price for the well feathered trees 3,90 €

The planting costs and the cost of tree care were the same. Also the grading method and the price per kilogram were the same: 37 €Cent per kg.

Considering 5 % annual interest and 6 % for hail insurance. The difference after 6 years was 18,548 € So the planting costs for the orchard with well feathered trees was paid after 4 years and with unfeathered trees after 5 years.

Our general demands for an ideal tree with a tree density from 2500 until 4000 trees a hectare are the following:

- At least 8 feathers
- The lowest branches at least 80 cm above the ground
- The shoot length at base should be between 40 and 50 cm
- Trees should have a wide crotch angle
- The central leader should have many dards.
- Tree height should be between 1,7 and 2 m depending on variety and spacing

Demands on variety:

For Gala a strong base is desirable. A short central leader is favourable because the variety has a strong apical dominance.

For Fuji we don't like too big trees, the branches shouldn't be too strong.

Braeburn in the nursery is producing a lot of feathers. Look for a wide crotch angle and for a mature wood

For Red Delicious it is important, that strength of the branches is equal and trees are not too big.

Internal quality:

The external quality is evident for everyone on delivery. Internal quality is not less important and sometimes some of those aspects are clear only after some years.

Therefore the nursery must give a guarantee for:

Phytopathological aspects such as:

- Virus infections
- Phytoplasmoses (C. Phytoplasma mali)
- Bacterial diseases (fire blight, crown rot)
- Fungal diseases (Phytophthora cactorum, Nectria galligena, ect.)

Today the trueness to the variety is not a problem any more. In the past with some unstable varieties we had problems with the stability of colour sport (mutation). Now, the nurseries are doing big efforts to avoid this problem.

A very important aspect under our climate are the virus infections:

Therefore rootstock and scion wood must be at least virus tested, better if they are virus free.

Concluding, the ideal young apple tree is:

- Ready for early production
- Free of pests and diseases
- True to variety and sport
- Certified – (A certification is the best way to guarantee about all these aspects, therefore we recommend certificated trees)

The second key success factor is **training and pruning**.

Introducing the dwarfing rootstocks from the Netherlands 30 years ago, a lot of people expected the failure of the M9 rootstocks, but the opposite was the result. The newer apple growing areas changed were quickly, observing the rising yields and the better fruit size.

Training and pruning changed. There was no experience how to treat trees planted 1 m apart. Also a lot of problems was the consequence: New strong-vigour soils in combination with a bud union not more than 10 cm and often wrong training and pruning – all these factors led to strong vigour, biennial cropping and bad fruit quality.

The goal is – achieving a balance of growth and cropping!

- A balanced tree is producing enough blossoms for regular yields and enough seasonal growth (5 to 20 cm) for removing old fruiting wood.
- A further goal is early and regular production
We expect for Golden Del.: 7-8 kg in the 2nd leaf, 10-12 kg in the 3rd leaf, 13-15 kg in the 4th leaf and from the 5th leaf 50 to 60 tonnes a hectare.
- For a good internal and external fruit quality, good light penetration is required
- The orchard life should be at least 15 years

Handling the central leader after planting:

Under normal growing conditions we do not cut the central leader:

- a) Trees with a central leader shorter than 50 cm we leave it unpruned
- b) Trees with a central leader longer than 50 cm – we bend it below the horizontal as soon as the shoots on the upper side have reached a length of approximately 10 cm straighten the leader again.

Handling the lateral branches:

- We recommend removing:
 - The branches below 80 cm from the ground
 - Further we remove branches which are stronger than half the leader
 - Too steep branches
 - If there are too many branches, especially on Fuji or Braeburn trees – the superfluous branches
 - Thin, weak and drooping basal branches we recommend to head to stimulate growth
 - Too long branches are headed back to approximately 50 cm and bent down steeply, if it is necessary.

In the next slide we see planting material with too long, too steep and too many feathers

Example A:

Training and pruning after planting:

Left slide before pruning and bending, right slide after pruning and bending: we remove the steep feathers, Bent the basal branches and the central leader.

Orchard A: After the 1st year

Left slide before, and right slide after pruning and training. The central leader developed a lot of dards. Pruning work is few, it remains to bend some steep branches.

Orchard A: After the 2nd year

Left before pruning. We have a slender central leader. Some too strong branches we remove and some bending work at the central leader.

Orchard A: After the 3rd year

We have a balance between vigour and cropping. Too many branches we remove, so we get a better light penetration. To weak fruiting wood we head or remove;

Advantage of Bending

Bending helps to convert the vegetative growth into generative growth.

With bending we can reduce the vigour and contain the tree to its allotted space, important when the orchard becomes older.

Pendent branches are fruiting more than steep branches

More bending work is necessary:

- on good vigour soils
- strong vigour varieties (Fuji, Red Delicious)
- biennial bearing varieties
- high density plantings (>3000 trees per hectare)

Pruning the bearing trees

The goal is to increase the light penetration trough:

- Elimination of entire branches
- We limit the tree height to 3 – 3,5 m
- Pruning the fruiting wood

Example: Golden after the 7th year:

Left slide: before pruning. We remove entire branches and get a better light penetration. The remaining branches are headed only, if the vigour is less than 15 cm in one year. So after pruning we have a tall slender spindle.

Pruning the fruiting wood:

It is important especially for varieties with small sized fruits. (Gala)

Head or remove thin or exhausted fruiting wood,

Prune pendent fruiting branches with a seasonal growth of less than 15 cm

Conclusion:

M9 rootstocks in South Tyrol is the standard, for the different soils from 300 m until 1000 m over sea level. Choose between the various M9 clones with the different characteristics.

Planting distances are:

between 3 – 3,2 and 0,8 – 1 with 3 and 4000 trees per hectare.

Tree shape:

The narrow, tall spindle are bringing the best results regarding yields and quality under our conditions. Platforms are used to reduce the labour costs, especially for harvest, pruning, hand thinning.

The tree height is up to 3,5 m.

Chemical thinning and Crop regulation:

A good chemical thinning program and a consequent hand thinning are the base for regular yields with a good fruit quality. On the slide you can see our chemical thinning program. Carbaryl will not be used after the season 2008.

For Golden we are using NAD (Amidthin), NAA and Benzyladenine.....

The optimal fruit number per tree :

Problems to avoid:

Before planting it is important to prepare the soil for a good root development. (Fix too humid soils with drainage and tallang;)

For the planting material look for the ideal tree and regarding the internal quality don't accept any compromise.

Good planting material will give you good results, when you are using the right training and pruning.

For a calm tree, a good chemical and hand thinning program are absolutely necessary

Future development for the Fruit Production in South Tyrol

In the last 30 years it was possible to increase yields through the optimal tree care. In the future it will be limited. For the different varieties it is necessary to change old poor coloring orchards with suitable colour-sports. The different varieties have their place on ideal locations (Golden, Pinova on Hillside, Granny, Braeburns in the Etsch Valley). New varieties will be introduced after testing at least for 3 years, on the different locations.

Hail and frost protection, will be necessary to secure a steady income. Food safety will be a key point in the fruit business and the organic production will be increasing further.