

# NOVEMBER 09 FUTURE ORCHARD 2012 WALK

## Modern Apple Growing In South Tyrol

**Martin Thomann and Jürgen Christanell**

**Beratungsring Group**

**South Tyrol**

The South Tyrol produces more than 1000.000 tons of apples every year; this is nearly 50 % of the total Italian apple production and 10% of the EU Apple production. About 8.000 Apple Growers are working on 18.443 hectares which represents an average of 2.3 ha per orchard. Despite the small farm size, in this region the apple production has an important economic value. A lot of small farmers have not only the apple orchard the have also vineyards. Some farmer has a guesthouse at home, and other farmer the have a small orchard and second work. 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. The European Apple Crisis gave the push to the step forward and changes the plantings systems.

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. The Extension Service was in the Nederland's and looked there fore the new plantings systems.

Especially in some new growing areas, as the Vinschgau Valley the apple production with the M9 rootstock was expanding very rapidly. The growers in this area are beginning in this time with the apple growing and so these growers choose the M9 rootstocks and the new planting systems.

The high density plantings wins trough:

<b>minus points</b>	<b>plus points</b>
• Problems with support system	• production costs dropped by 50 %
• Lack of virusfree rootstocks	• Reached break even point earlier
• More russeting	
• Too weak growth	
• Lack of virusfree rootstocks	• Reached break even point earlier

The slender spindle for years ago is changed now in a tall slender spindle. The tall slender spindle give us one meter and more production space in confront of the slender spindle. And after some doubts at the beginning, most of the growers saw the advantages of the M9 rootstock and the slender and tall slender spindle: 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, underrated 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 T 337, Nicolai 29 ist 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 root suckers. 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 root suckers. 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 Nederland's 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 were 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:

Phytosanitary 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 is 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 Nederland's 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 were 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 2<sup>nd</sup> leaf, 10-12 kg in the 3<sup>rd</sup> leaf, 13-15 kg in the 4<sup>th</sup> leaf and from the 5<sup>th</sup> 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 1<sup>st</sup> year

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

Orchard A: After the 2<sup>nd</sup> 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 3<sup>rd</sup> 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

The 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)

Slide about bending:

right bending

wrong bending

trees without bending in the 4<sup>th</sup> leave



## Pruning the bearing trees

The goal is to increase the light penetration through:

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

Example: Gala after the 7<sup>th</sup> year:

Left side: 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. With more light you have also an effect of the crop loading.

Example: Braeburn after the 8<sup>th</sup> year:

With Slender tops the light penetration is easier and more light inside the tree favoured the new flower buds.

Example: good slender top with enough pendent fruitwood and not too much growth

Example: wrong pruning without bending

Example: too heavy pruning without bending a new pruning system from the Nederland's called "Klick Schnitt".

## 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

Example: fruitwood without growth for the pruning and after.

More practical consideration of pruning:

## Conclusion:

M9 rootstock 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 spindles 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.

## Problems to avoid:

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

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.

### **The south Tyrol farmers invest:**

new orchards  
Hail net  
lift platforms

### **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. 2009 was the first year without Carbaryl.

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

### **The optimal fruit number per tree:**

**Some slide about mechanic thinning with the Darwin:**

**Some slide about new planting systems:**

**BI BAUM,**

**SOLAXE,**

**MUIR FRUITIER,**

**2D – System,**

**Graphics with the labour costs and the production costs for a kg apple.**

**Graphic: new planting in the last 20<sup>th</sup> years.**

**Graphic: new planting 2009**

**Graphic: variety mix 2009**

**Graphic: about our two biggest marketing organisations**

