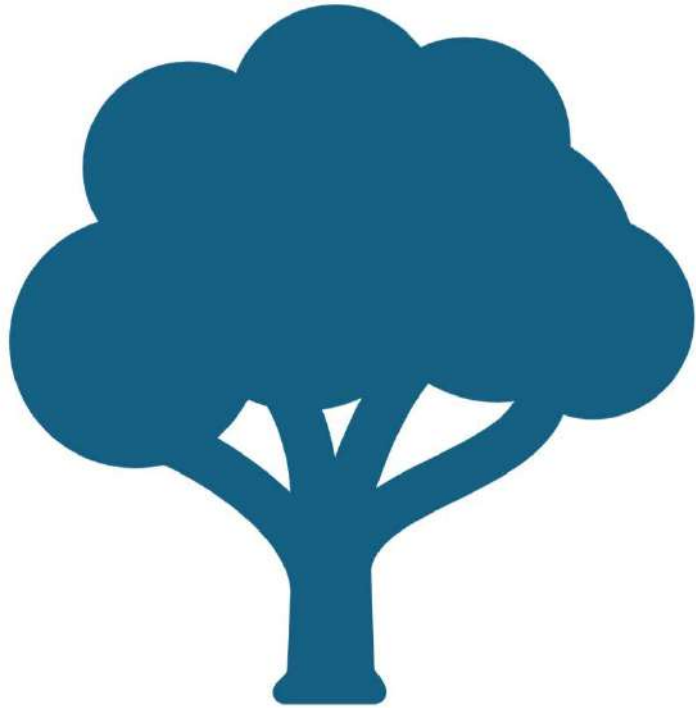




# Planting systems for stone-fruit

Should we consider different planting systems and why?

# "Challenges in Stone Fruit Growing Systems"



- Strong apical dominance
- Balance in trees from early age → often fighting tops
- Uniformity of product
- Percentage of best quality
- Harvest performance





Tops in cherries and plums can be permanent headaches

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- Cherries and plums are part of the Prunus family
- Typical for Prunus is high apical dominance

# Umbrella shape

- Plums, and even more so cherries, are strongly apically dominant.
- This dominance often leads to the development of high-quality renewal wood in the upper parts of the trees.
- The lower part of the tree is often lost, resulting in old and bare wood.
  - This issue is partly caused by delayed renewal of wood in the lower parts of the tree.
- Trees develop an umbrella shape with strong tops.
- Production shifts to the upper half of the trees, further strengthening the tops.





Losing the  
lower part  
of the tree

# Dividing apical dominance over more than one leader

Will result in calmer top growth

Therefore, less chance of trees becoming bare in the lower part

Multileader systems can help to reduce height of the trees without compromising on production wood (lower part of the trees stays naturally more active)

Calmer top growth and less reason for interventions in trees ( less strong pruning) results in earlier tree balance → earlier into production

Lower trees can mean:

husbandry and harvesting from ground level

Better "fit" under (lower) covering systems and therefore also less sensitive to storm and gale force winds

# The ideal tree shape

Cylinder shape (KGB and Spanish bush)



Wall system as in drapeau or UFO

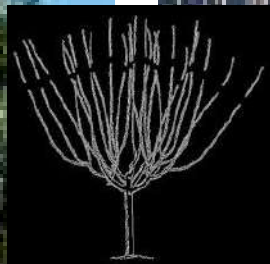


Pyramid tree as in central leader





Spanish Bush and KGB (multiple leader) better growth control but much poorer light distribution (not a wall as we see in drapeau or UFO)







Multi leader  
systems help to  
improve growth  
control (UFO)





The ideal shape of a Prunus tree, in relation to apical dominance

Wall system so going from M3 to M2 as **Drapeau and UFO**

Apical dominance is divided over more points





From cubic to square meters

# Mature UFO, in England (Haygrove)





Young UFO  
in Poland





Drapeau  
versus UFO



# Primary branches and secondary branches

UFO systems rely mainly on  
primary branches that come  
off the central axe



# Primary branches and secondary branches

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- **Drapeau Structure:**  
Drapeau initially develops primary branches that grow from the central axis.
- **Secondary Branches:**  
Secondary branches also grow from these primary branches.
- **Production Potential:**  
Drapeau offers more volume and higher production potential compared to UFO systems.
- **Semi-Wall System:**  
The Drapeau system provides excellent access to all the fruit, making it efficient for harvesting and management.



# Drapeau versus UFO

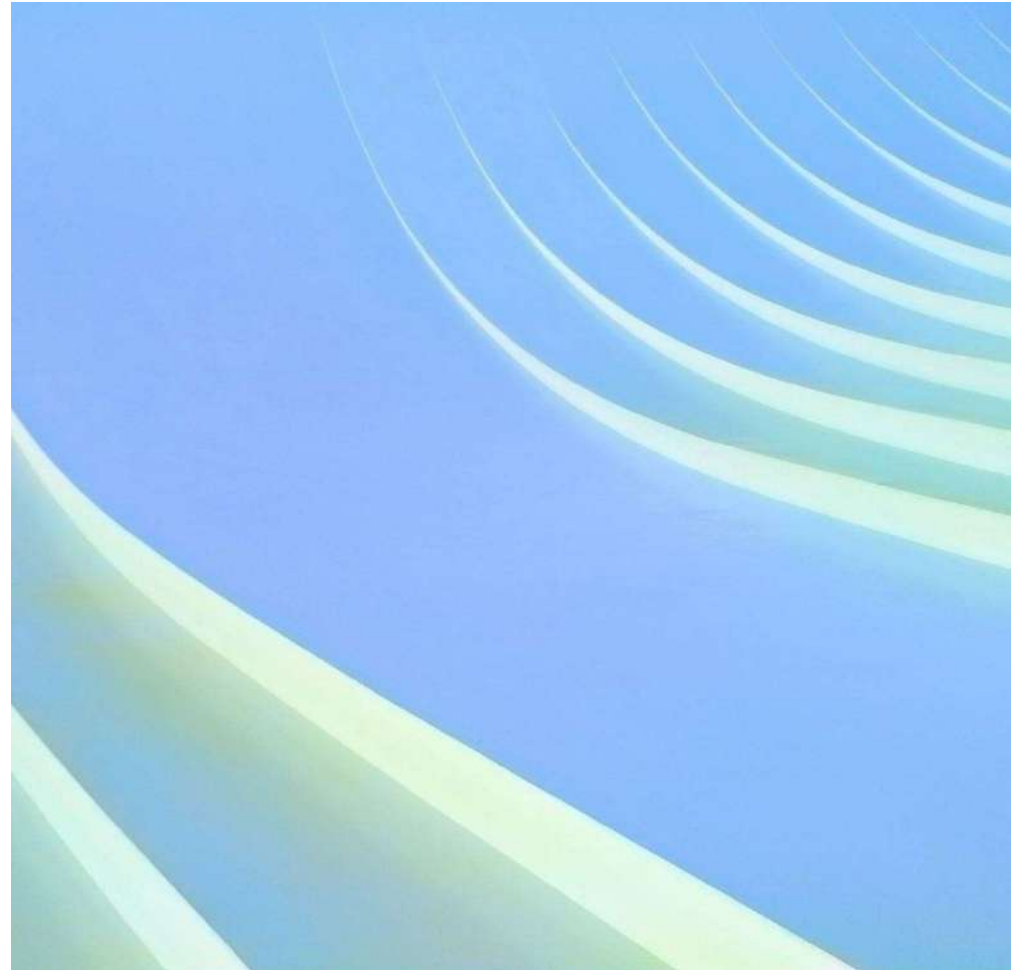
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Both systems divide the apical dominance over several leaders

UFO is more suitable for spur growing varieties as Lapins, Sweetheart, Staccato

Drapeau is suitable for both spur growing and –on secondary wood- growing varieties e.g., Kordia, Regina etc..

Drapeau very suitable for plums and apricots





# Drapeau versus UFO

## Drapeau= “a Hybrid system”

- **Management:**  
Drapeau can be managed as a semi-hybrid system, optimizing both square and cubic meters in tree design.
- **Central Axis Planting:**  
The central axis is planted at a 45-degree angle with the soil, while primary branches grow at a 90-degree (or larger) angle from the axis.
- **Secondary Branch Management:**  
Primary branches support secondary branches, which are maintained as short production wood (20–25 cm), creating a "wall" that is 40–50 cm thick.
- **Spacing Flexibility:**  
Primary branches can be spaced wider apart since secondary wood is also utilized.
- **Increased Production Area:**  
The total production area is larger compared to the UFO system, and when managed effectively, it ensures uniform product quality.
- **Higher Yields:**  
Drapeau achieves higher yields and enters production earlier than the UFO system.

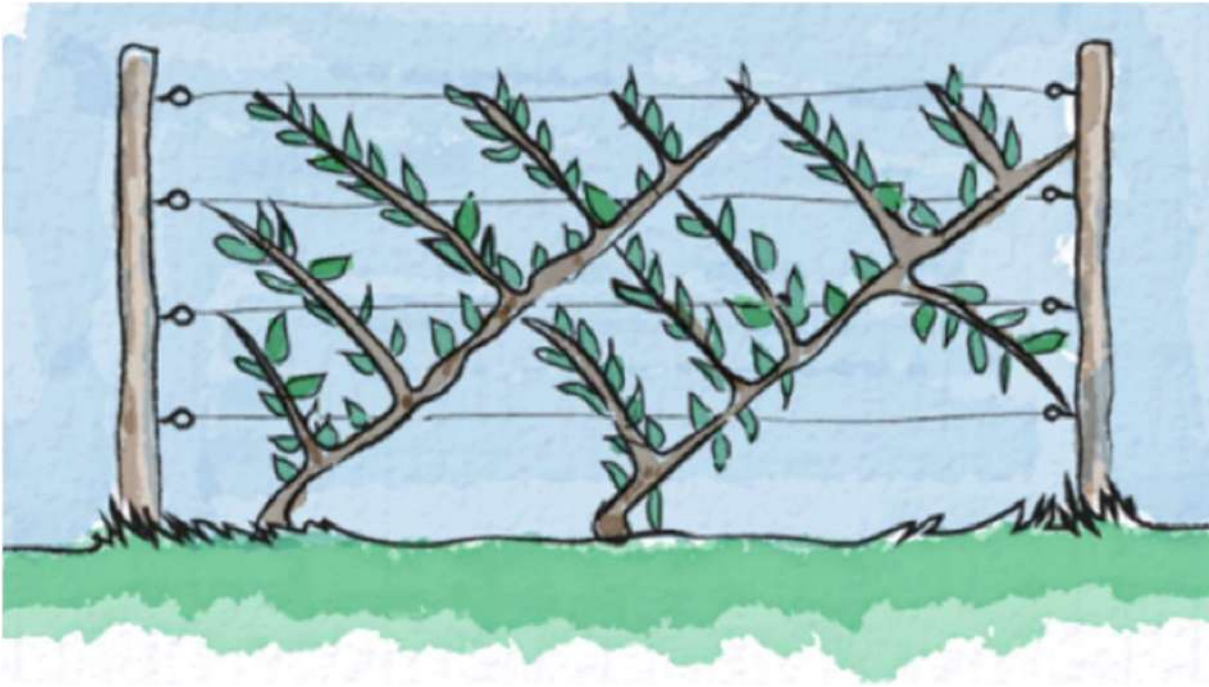


# Drapeau versus UFO

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- **UFO Training System:** The middle section of the central leader is trained to grow almost horizontally.
- **Primary Branches:** These branches grow out from the horizontal portion of the central leader.
- **Vertical Spur Management:** The primary branches are managed as either “vertical spur trees or vertical spur branches” growing upward from the central leader.
- **Spacing Between Uprights:** There should be approximately 20 centimetres of space between the upright branches.
- **Pruning for Quality:** Regular substitution pruning of primary branches is necessary to maintain the quality of the tree structure and fruit production.





# Drapeau system

A simplification of the system



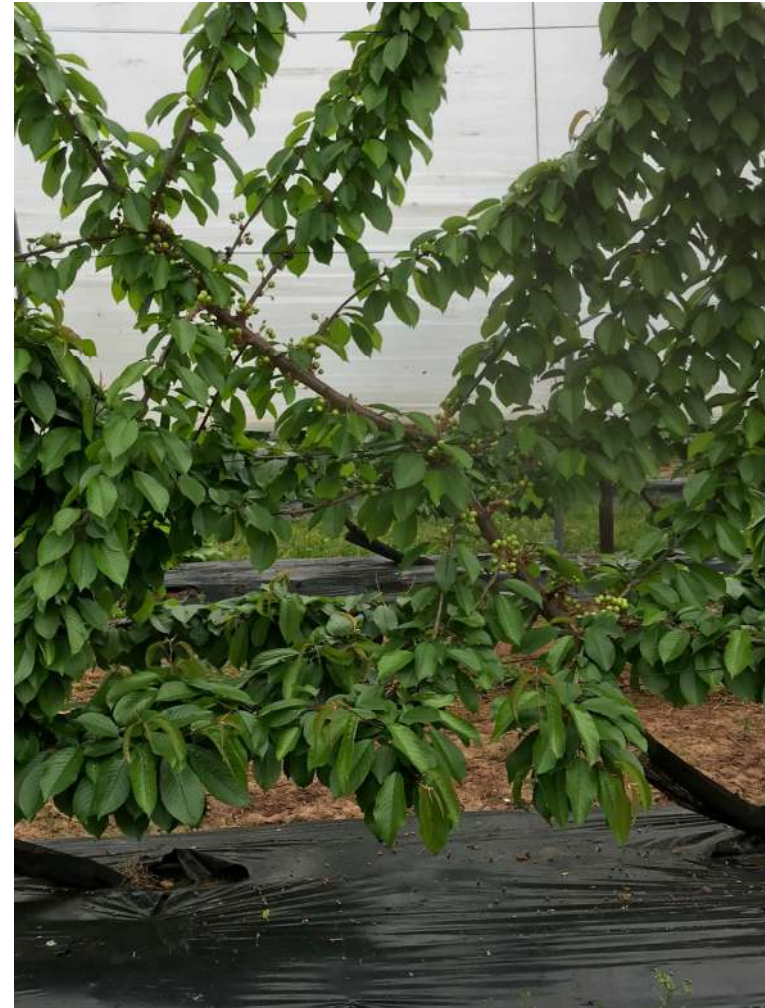
- Includes a table in the lower part
- Primary branches have developed from the central axel
- Off the primary branches secondary branches will develop during growing season 24

Drapeau, starting year 3, Folfer UK  
Spring 24



## Drapeau Folfer year 3

- **Minimal Pruning:** Virtually no pruning is required, even in year 3.
- **Focus on Tying Work:** In year 2, and often in year 3 as well, the primary task is tying the branches rather than pruning.





Multi-Leader Systems: These systems encourage more controlled growth, such as the "drapeau" system, which is a semi-multiple leader approach.



# Multi-Leader Systems

- Systems where apical dominance is distributed across multiple leaders.
- When grown as a wall system, they achieve greater uniformity in quality. → Square meters of production
- Systems like the Spanish bush provide better growth control but still focus on producing cubic meters of production volume.
  - **Note:**  $M^3$  systems result in significantly more shading compared to  $M^2$  systems.

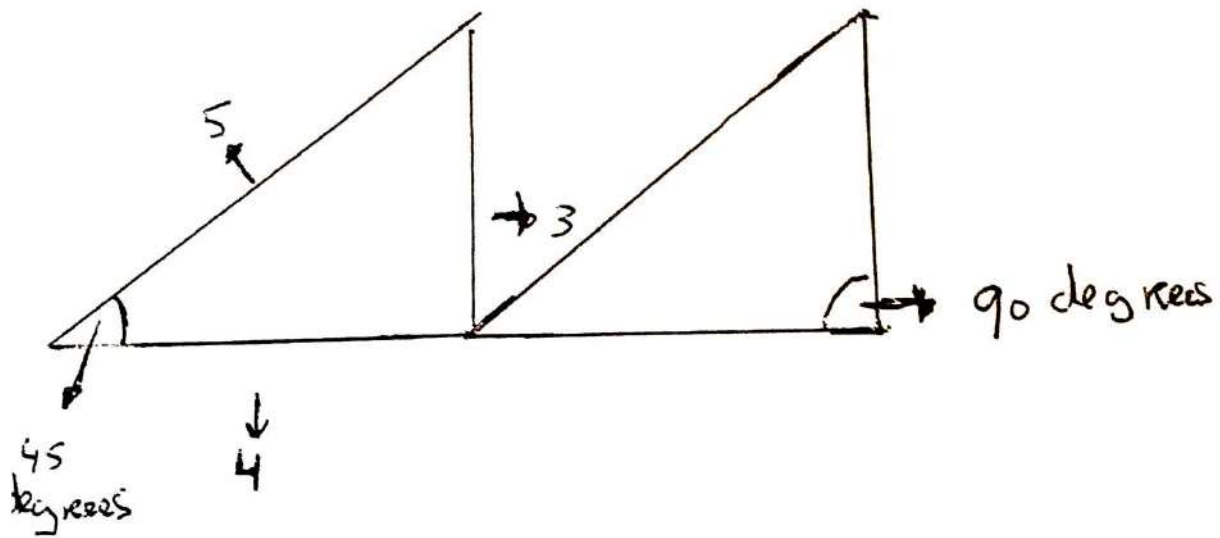


## Strong top pruning, single leaders

- "Amputating" is sometimes necessary to manage top growth.
- Strengthens the branches below the topped area. Promotes strong, thicker wood growth at the top.
- Causes significant shading.
- Often done too late, requiring "curative pruning," which can further imbalance the tree.







**PYTHA  
GORAS**

## EXAMPLE



```
graph TD; A[EXAMPLE] --> B["• If the spacing \"down the row\" is 200 cm (2meters)"]; B --> C["• And the final height is limited to 220 cm ( 2meter and 20cm) (measured at a 90-degree angle from soil level)"]; C --> D["This means the total central leader length will be: 2.97 meters (=2.20 meters measured straight)"];
```

- If the spacing "down the row" is 200 cm (2meters)

- And the final height is limited to 220 cm ( 2meter and 20cm) (measured at a 90-degree angle from soil level)

This means the total central leader length will be: 2.97 meters (=2.20 meters measured straight)

=297 cm

- When compared to trees planted straight, you gain an additional 77 cm before the top of the leader is directly above the next tree.
- Additionally, the leader extends smoothly over the top wire, meaning you don't necessarily need to trim it back.
- By avoiding cutting into the leader or delaying the cutting, you minimize excessive top growth to the absolute minimum.



# leader reaches the top wire

Additional length without  
cutting



Let it flow further over the top  
wire





# Drapeau system

- There is no immediate need to interfere with or cut into the leader, which helps keep the tree growth more controlled and calmer.
- The side branches are tied at a 90-degree angle away from the leader, further reducing strong apical dominance.
- Almost all the new wood produced by the trees can be utilized effectively.



# Drapeau with tabletop in the lower part

- The table promotes additional production in the lower part of the tree.
- The wall above provides good light distribution onto the table.
- A wall positioned above the table ensures even light distribution across the entire tree.
- The row spacing is 3.50 meters or more.





# Using whips (plums) for narrow wall (3meters or less)

Drapeau plums



➔ Narrow wall plums





Plums narrow wall  
drapeau,  
Ravensburg  
(Germany)





Square  
metres of  
production



# Drapeau plums narrow wall



## Wisbech UK

A plum variety trial eventually became a planting system trial.

•Through the trial, we demonstrated that the Drapeau system:

- Achieved the highest production.
- Resulted in early production due to minimal interference with the tree (no pruning).
- Required considerable extra effort in the early years to establish the system (approximately 200 hours per hectare).





## Opal in drapeau, Maidstone (Kent)

Tabletop in the lower part combining:

- ☐ vertical square meters (wall) with
- ☐ horizontal square meters (table)



# Opal in drapeau, Maidstone (Kent)

**Easy thinning/harvest**



**Good light distribution → uniformity**





# Twin leaders coming from the nursery

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- You can tie both leaders at a 45-degree angle in each direction, following the row.
- Each leader can then produce another leader, transforming the trees into a 4-leader tree with minimal effort.
- Twin-leader trees are not more expensive than knip-trees but are typically produced only upon order.



## Twin leaders coming from the nursery, double UFO

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- You can tie both leaders almost horizontal in each direction but let the top(s) come up slightly →
- following the row and grow uprights on both
- turning the trees in a double UFO system
- Twin leader trees are not more expensive as knip-trees but must be usually only produced on order.





# Twin leader from the nursery leaving as a twin leader in the orchard

- In Prunus types, when apical dominance is divided between just two leaders, one leader often becomes much stronger than the other.
- This stronger leader takes over the apical dominance, leaving the second leader weaker.
- While the second leader may still fill space in the lower part of the tree, the stronger leader ends up becoming as dominant as a single leader would.
- The conclusion is that the more we can divide the apical dominance, the easier overall tree management becomes.





# What is the best growing system?

- A multi-leader system with more than two leaders.
- Additional leaders help maintain better tree balance compared to 1-2 leader systems.
- Improved balance reduces pruning needs and simplifies orchard production → Promotes earlier coming into production





# What is the best system?

- Develop a multi-leader system with more than two leaders while ensuring efficient light distribution. This will:
  - ➔ Enhance the uniformity of the product across the system.
  - ➔ Optimize picking and thinning efficiency for better performance.
- So, it is a transition from focusing on cubic meters to square meters wherever possible.
- Minimize shading between leaders, avoiding issues seen in systems like KGB or Spanish Bush.

# What is the best system? UFO....

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- Switching entirely to growing only uprights (primaries) in the UFO system risks reduced production.
- The UFO system requires narrower row spacing to mitigate this risk.
- Allowing some spurs in UFO to develop or using fewer uprights can promote secondary wood growth, similar to the Drapeau system.
- This approach creates a mild hybrid system, involving compromises and diverging from a true UFO system.
- The Drapeau system combines square meters with (narrow) cubic meters, maximizing production without compromising quality.





# Conclusion

- For **plums**, I recommend to go for a drapeau, with or without table.
- A UFO is no real option for plums
- For **cherries**, I recommend in first place drapeau, with or without a table
- Alternatively for cherries, a UFO with narrow alleyways,
- or a UFO hybrid in which you allow some short sidewood and even potentially a small table.

Go for a system that suits your circumstances →  
Covering systems, labour availability, or other specific circumstances may determine choice.





Thank you very much

Questions?

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