Wine Grape Trellis and Training Systems

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2018 Wine Grape Vineyard Establishment Conference

Trellis systems

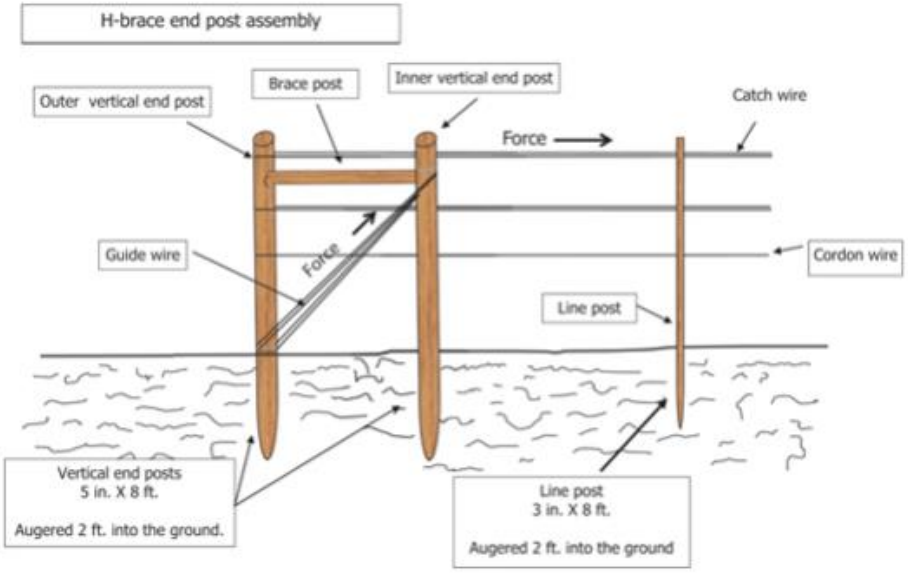
Definition

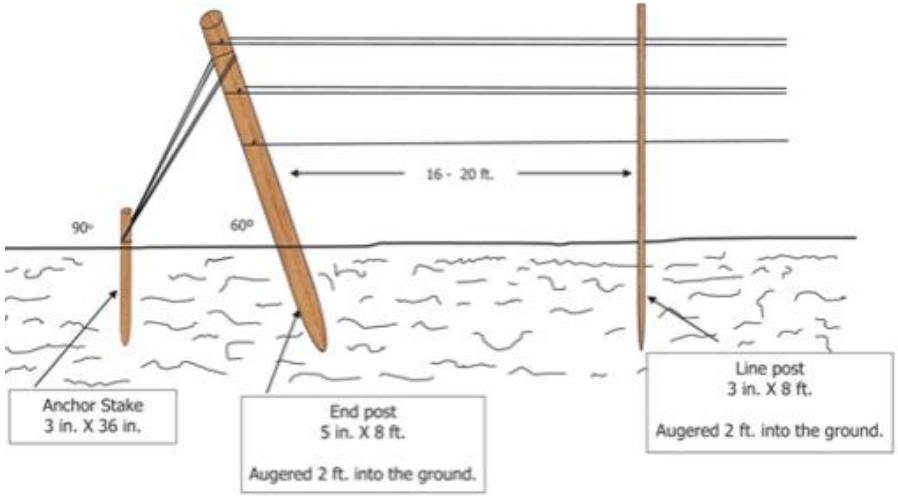
- **A support structure for the grapevine.**

FIGURE 24. Establishing the trellis during the planting year facilitates vine training.

Purpose

- **Maintain vine form and provide maximum sunlight penetration for buds and clusters**





Trellis systems vary in:

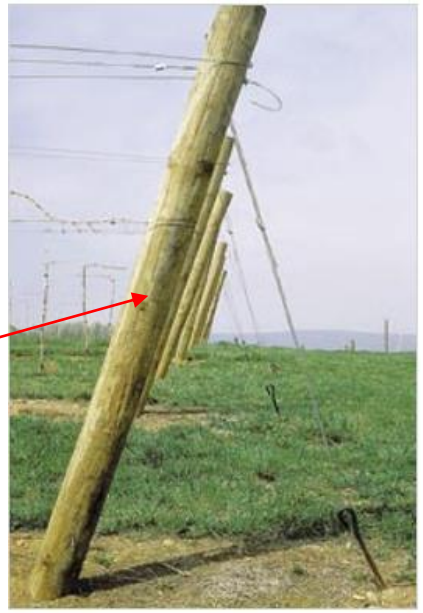
- **Height**
  - Higher the trellis = greater light interception
  - Extremely high and low trellis can reduce labor efficiency

- **Types, number and location of wires**
  - 9-guage vs. high tensile steel
  - Single, multiple fruiting wires / vine row
  - Catch wires and non-catch wire systems

- **Post types and size**
  - End posts : 9-10”, 4-6’ diam.
  - Line posts : 8-9”, 3’ diam.

- **End post anchor**
  - H-system
  - Dead-man
  - Screw

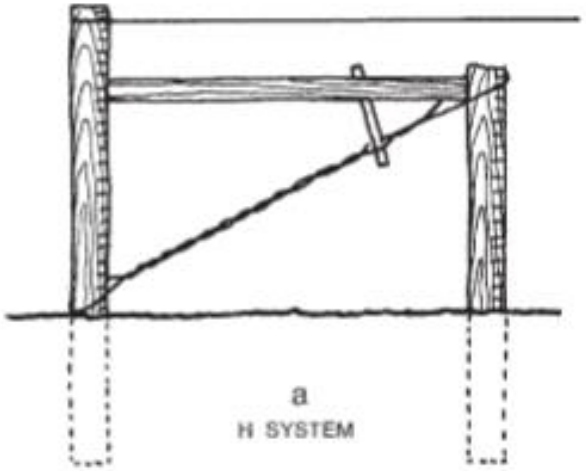
- **Cost of establishment**



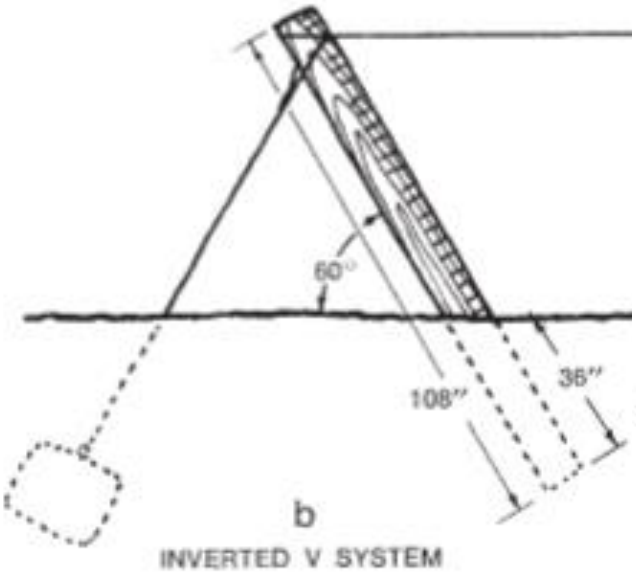
Pressure treated!!!
Cedar, Black locust

Trellis end posts

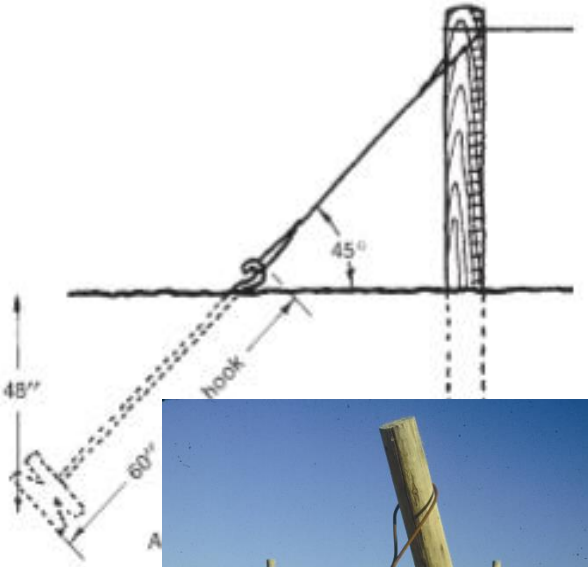
H



Dead-man / inverted V



Screw / V



Trellis Line posts

- **Influenced by**
  - **Availability**
  - **Installation equipment**
  - **Vine training system**
  - **Cost**

Optimum trellis systems will:

- **Be strong and long-lived;**
  - **Permanent with little annual maintenance**
- **Supports the above ground vine components**
  - **Trunk, cordons, arms, spurs, canes**
  - **Foliage and fruit**
- **Withstand elements**
  - **Wind, rain, cold, heat**
- **Adaptable to modern mech.**
  - **Pruning and harvesting**
- **Economical to construct**

Training System

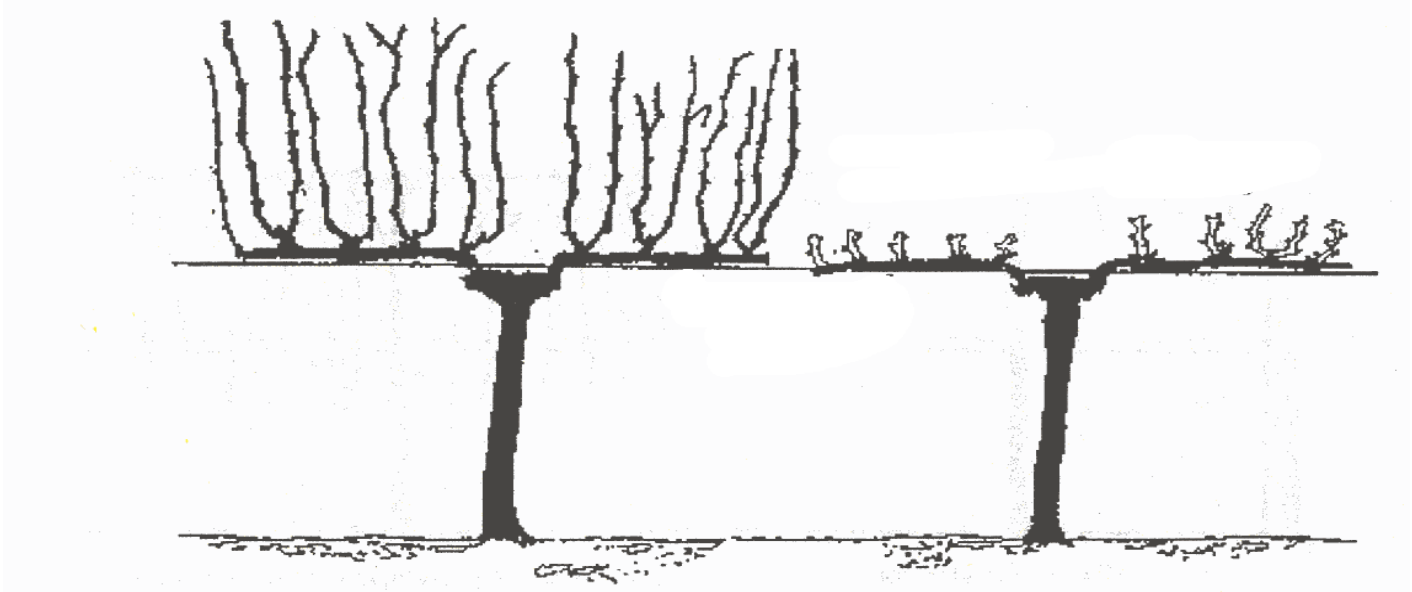
Definition

- **A form in which a grapevine is cultivated.**

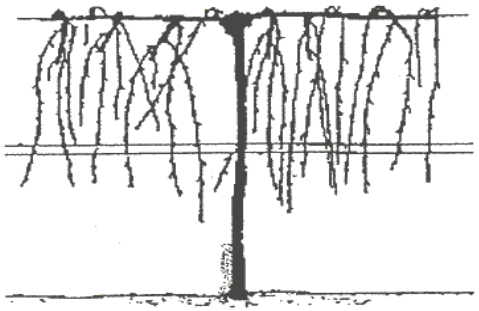
Purpose

- **To facilitate canopy management and promote vegetative (shoots and leaves) and reproductive (fruit) growth. “Vine Balance”**

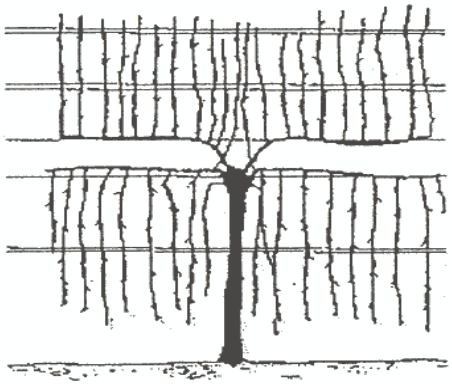
International standard = Bi-lateral cordon, vertical shoot positioning



Selecting Training and Trellis Systems

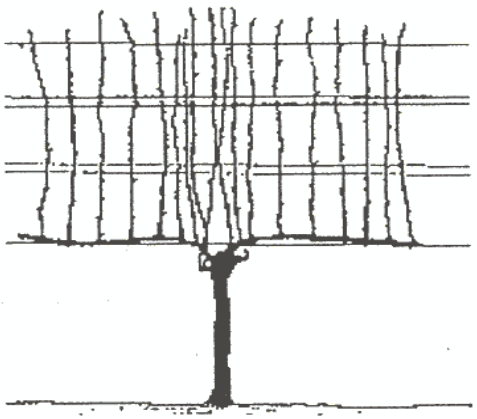


Hudson River Umbrella

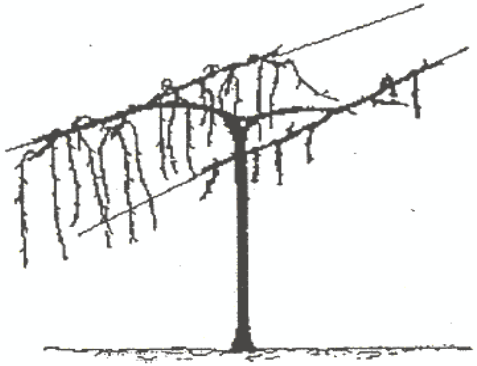


Scott-Henry

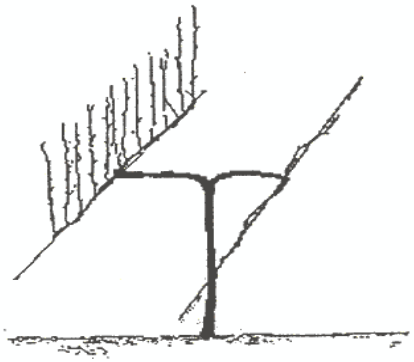
?



Guyot



GDC



Lyre

Training systems vary in:

- **Yield & quality**
  - **A function of sunlight interception**
- **Labor**
  - **Canopy management**
  - **Mechanization**
  - **Facilitation of equipment**
- **Suitability for varieties**
  - **Upright or procumbent growth habits**
  - **Fruitfulness of base buds**
- **Suitability for climates**
  - **Wet, dry, cold, hot**
- **Cost of establishment**

Table 11. Exposed Canopy Surface Area for Different Training Systems (Smart, 1996).

Trellis System	Surface Area for 12-ft. Row Spacing (m^2/ha)
VSP	8,500
HC	12,500
SH	13,100
SD	13,100
SD – Ballerina	13,700
GDC	20,000

Optimum training systems will:

- **Promote uniform bud break**
- **Maximize sunlight exposure / minimize shading**
- **Promote vine balance (vegetative : fruit)**
- **Create desirable microclimate conditions**
  - **Optimize wine quality, disease control and yield**
- **Implement "Spare parts" philosophy**
  - **Extra trunks**
  - **Delayed pruning / minimal**
  - **Retaining spurs at the trunk base**
  - **Cane burial**

Ripen the maximum amount of fruit without sacrificing quality (fruit and wood) at the lowest economic cost

American Cultivars

- **Typical of *Vitis labrusca* (Concord)**
- **Procumbent (drooping) shoot growth habit**
- **High yield per vine**
- **Very cold-hardy**

European Cultivars

- ***Vitis vinifera*** **as dominant parentage**
- **Upright shoot growth habit**
- **Low yield per vine (about 15 lb)**
- **Cold-tender compared to American cultivars**

Hybrid Cultivars

- **American and European genetics**
- **Most have a procumbent shoot growth habit**
- **High yield per vine**
- **Relatively cold hardy, some very cold hardy**

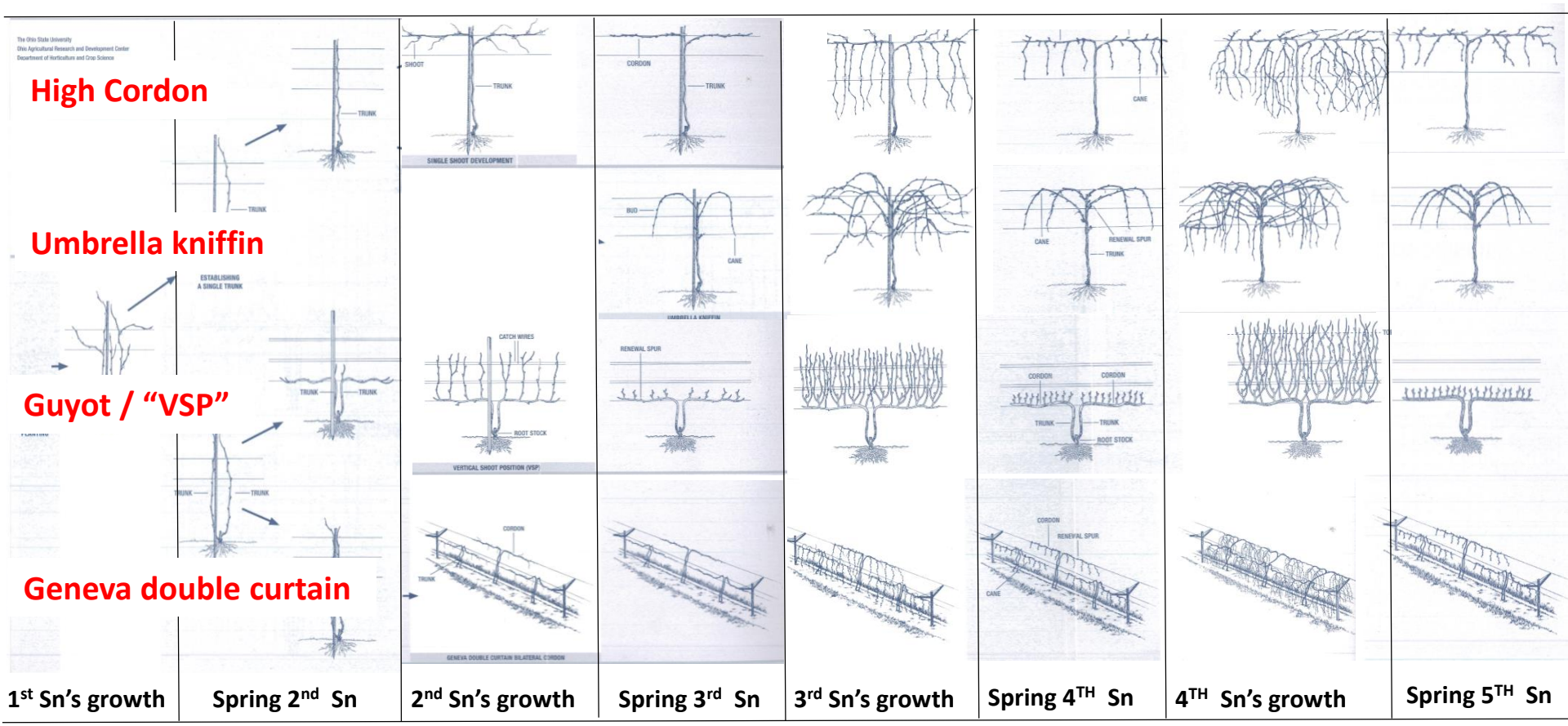
Genetic potential of the genotype (variety)

Cold Hardiness of Grape Genotypes

Cold hardiness class	Range of critical temp (LT50 °F)	Species	Examples of varieties
Very tender	5 to -5	Most *V. vinifera*	Merlot, Semillon, Syrah, Sauv. Blanc
Tender	0 to -8	*V. vinifera*	Chardonnay, Cab Sauv, Gewurztraminer, Pinot gris, Pinot noir
Moderately tender	-5 to -10	Some *V. vinifera*, some hybrids	Riesling, Cab. Franc, Lemberger,Chambourcin
Moderately hardy	-10 to -15	Most hybrids	Chardonel, Traminette, Norton, Seyval
Hardy	-15 to -20	Most *V. labrusca*	Catawba, Concord, Delaware
Very hardy	-20 to -30	Some hybrids	Frontenac, Foch, LaCrescent

(Zabadal et al. 2007)

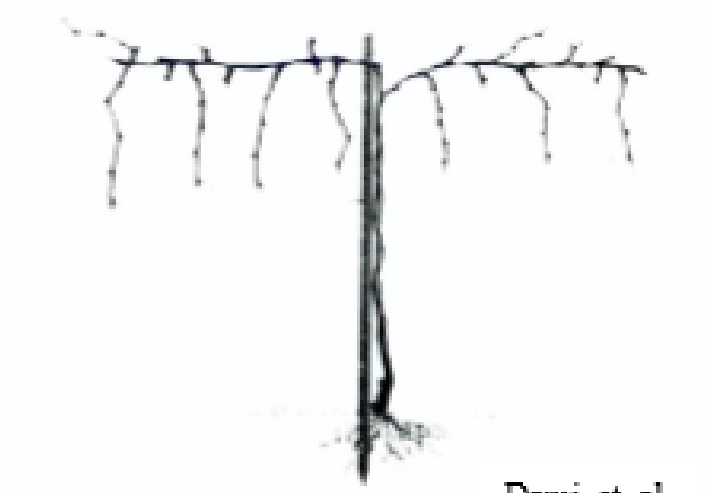
Grapevine training and pruning



Dami et al. 2005
Midwest Grape Production Guide

Training Systems for Procumbent Vines

- **High Cordon / Top Wire Cordon**
- **Geneva Double Curtain**
- **Umbrella Kniffin**



Dami, et. al

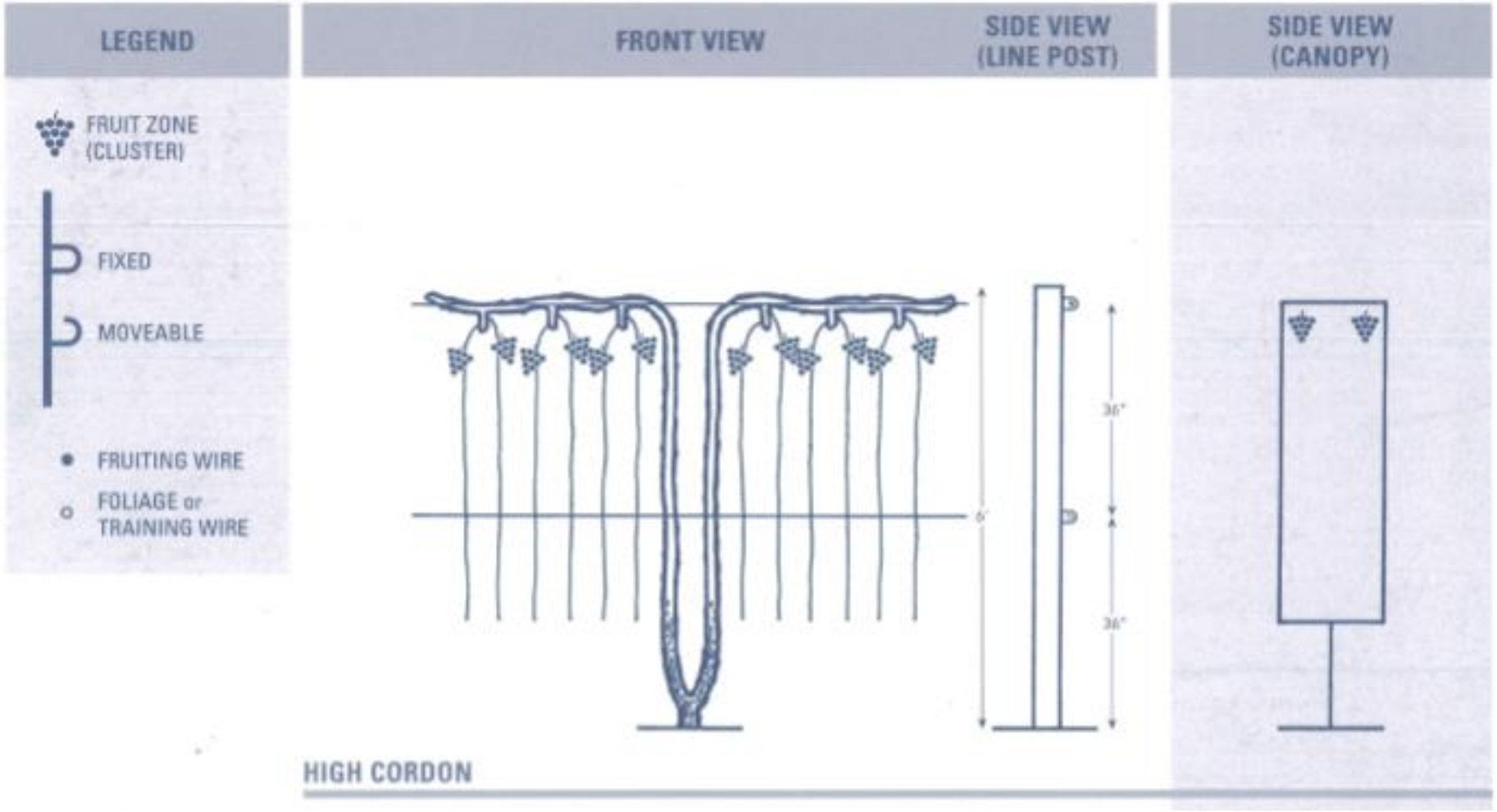
High Cordon / Top-Wire Cordon

Active

Dormant

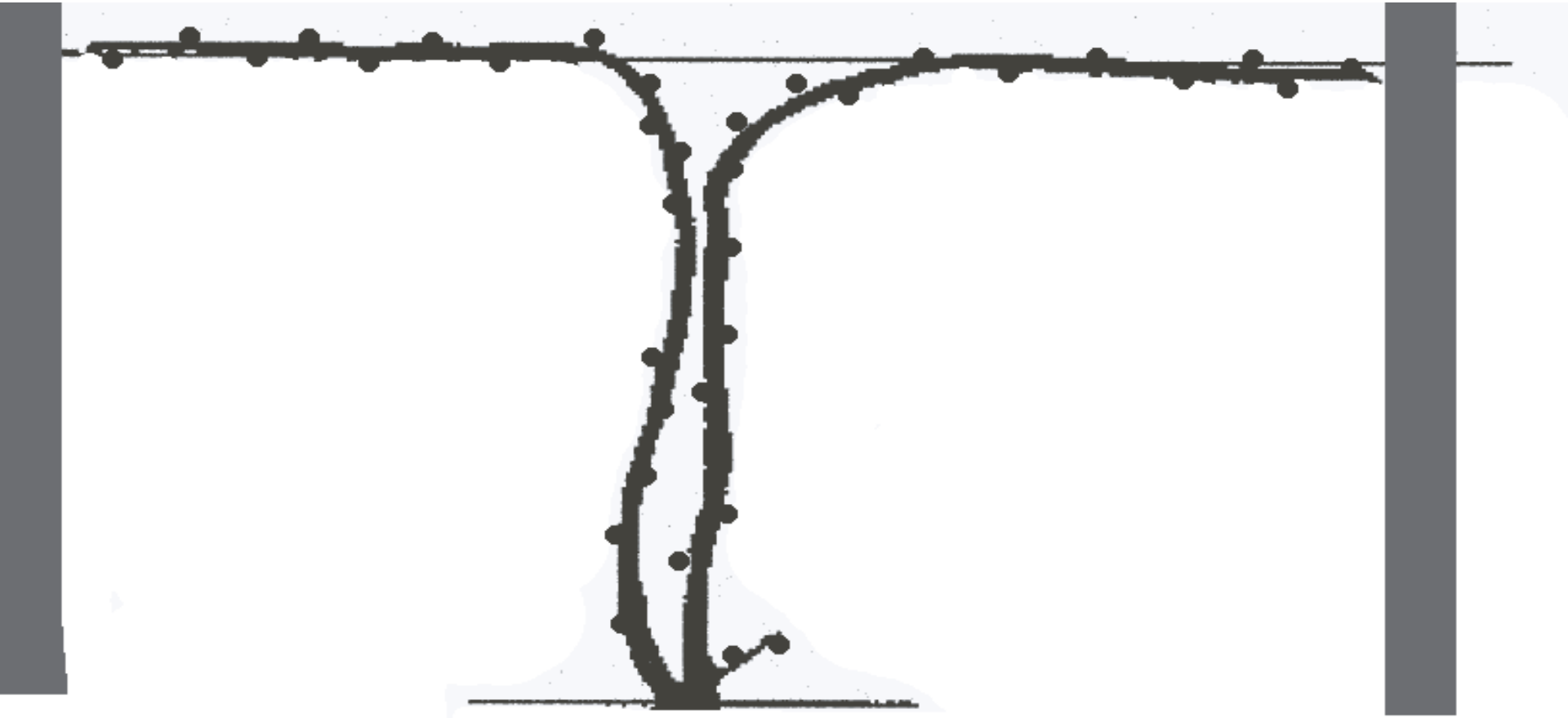
High Cordon Growth, Training & Pruning

- **Requires a single “bearing” wire**
- **Typically 5-6 foot above ground**



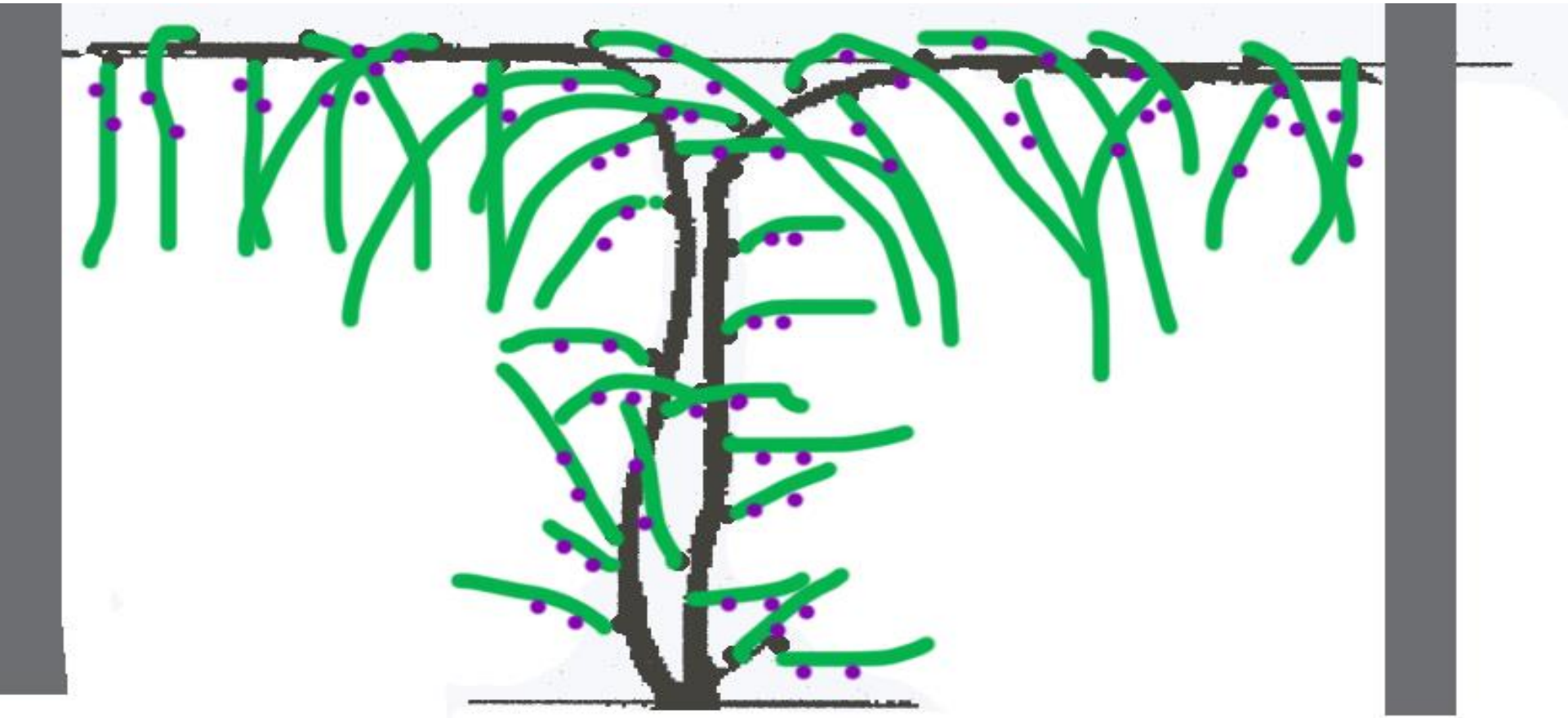
High Cordon Growth, Training & Pruning

- **1st bearing year (3-4 year old vines)**
- **All 1 year old canes**



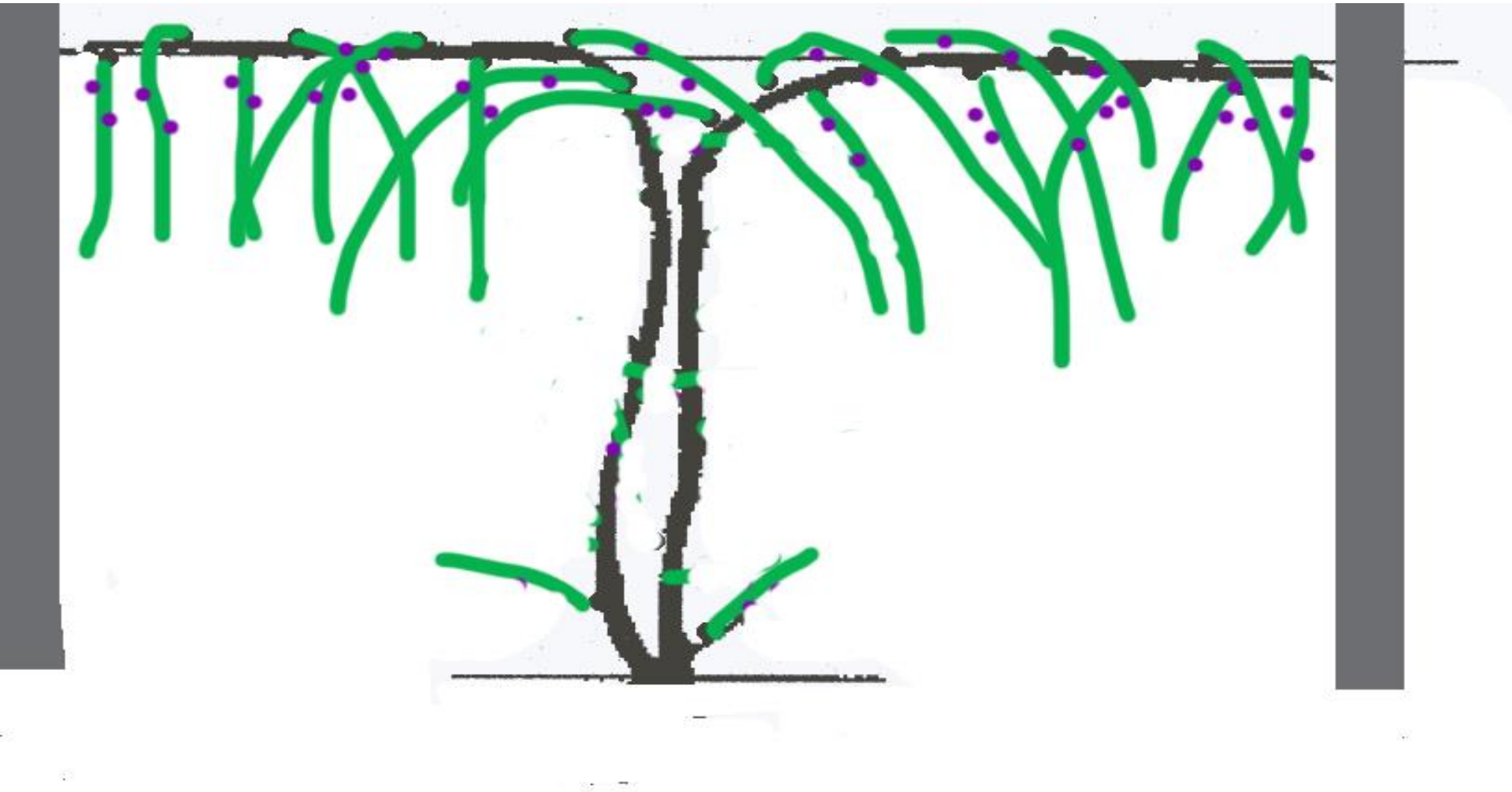
High Cordon Growth, Training & Pruning

- **Early season shoot growth**



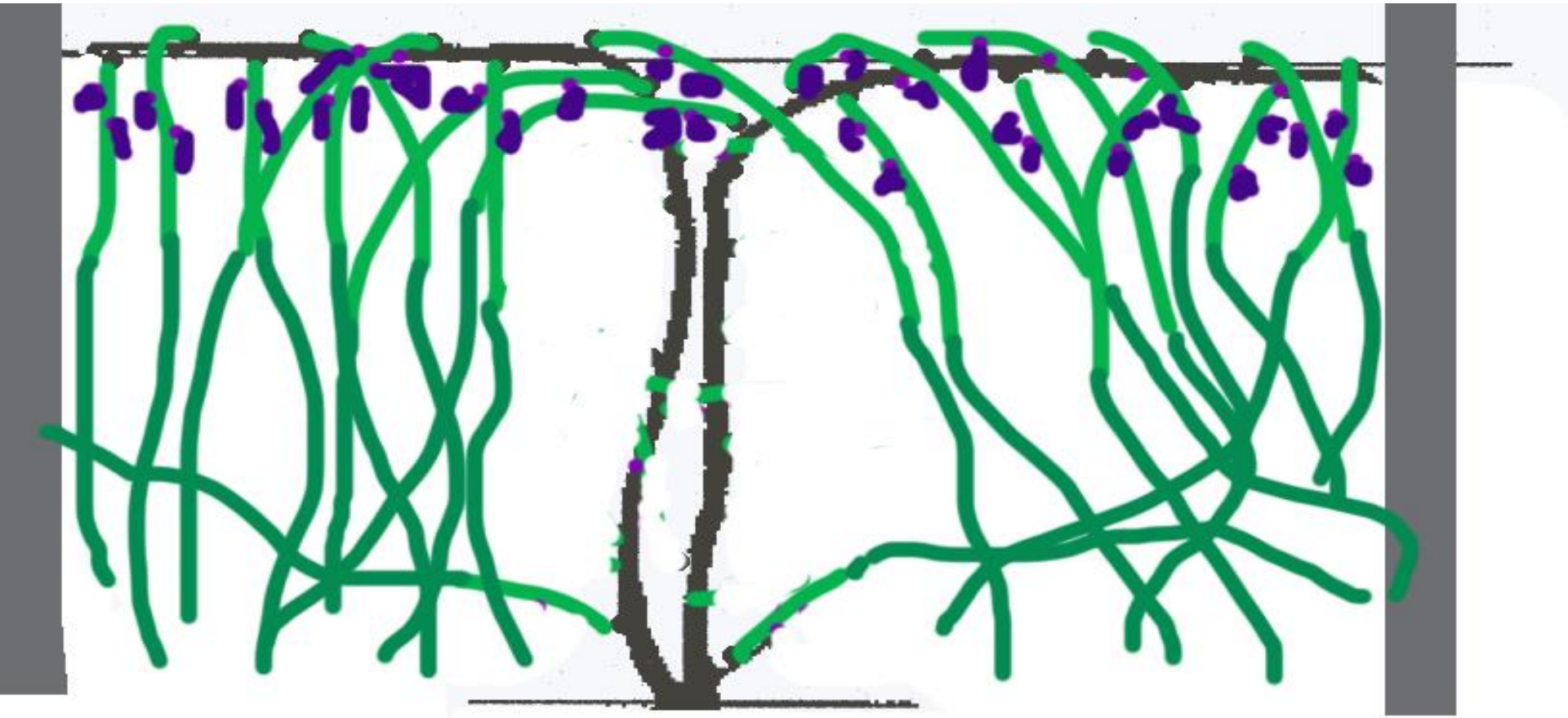
High Cordon Growth, Training & Pruning

- **After removing suckers and unwanted fruit**



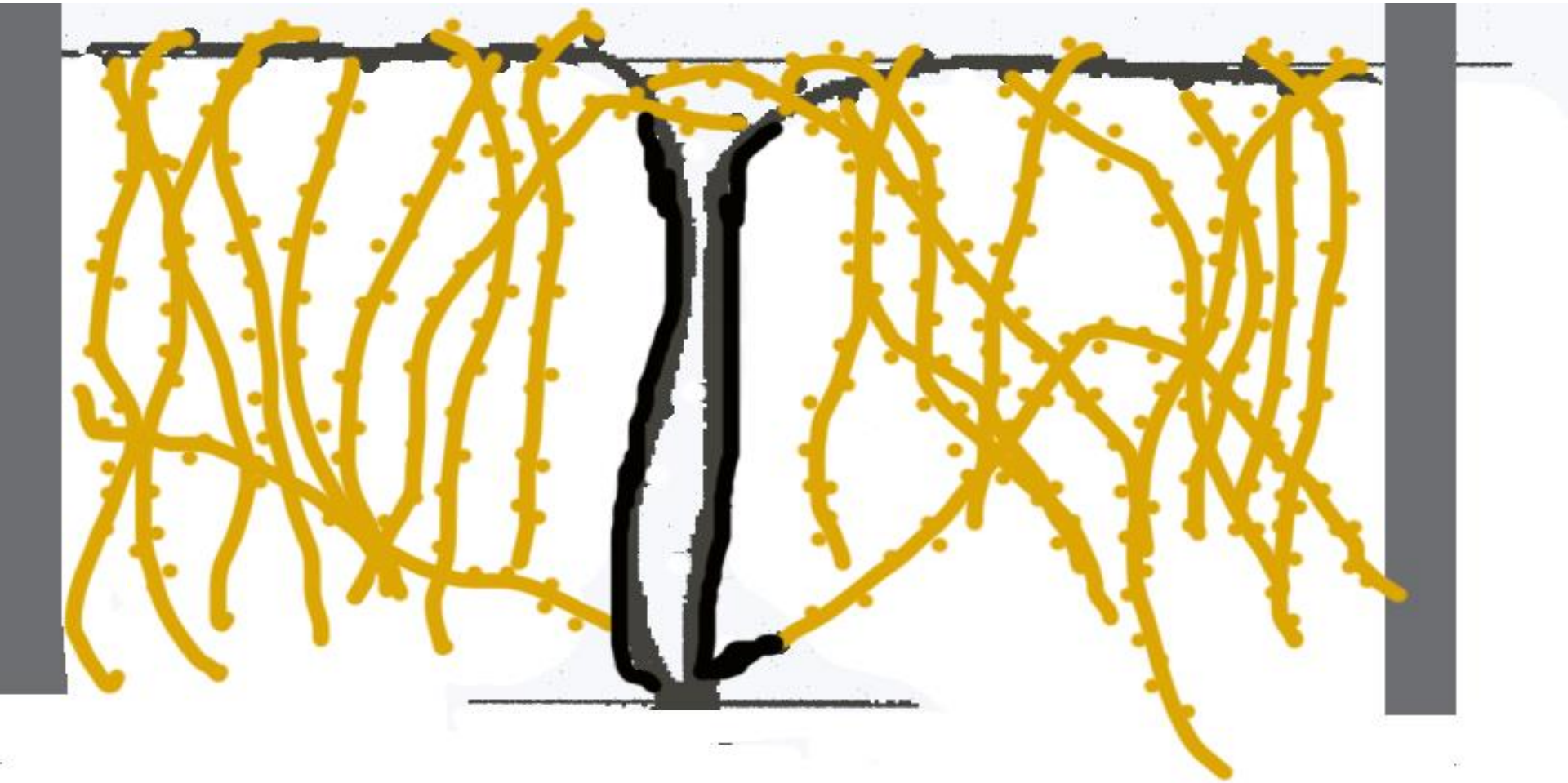
High Cordon Growth, Training & Pruning

- **Shoot growth by end of season - harvest**



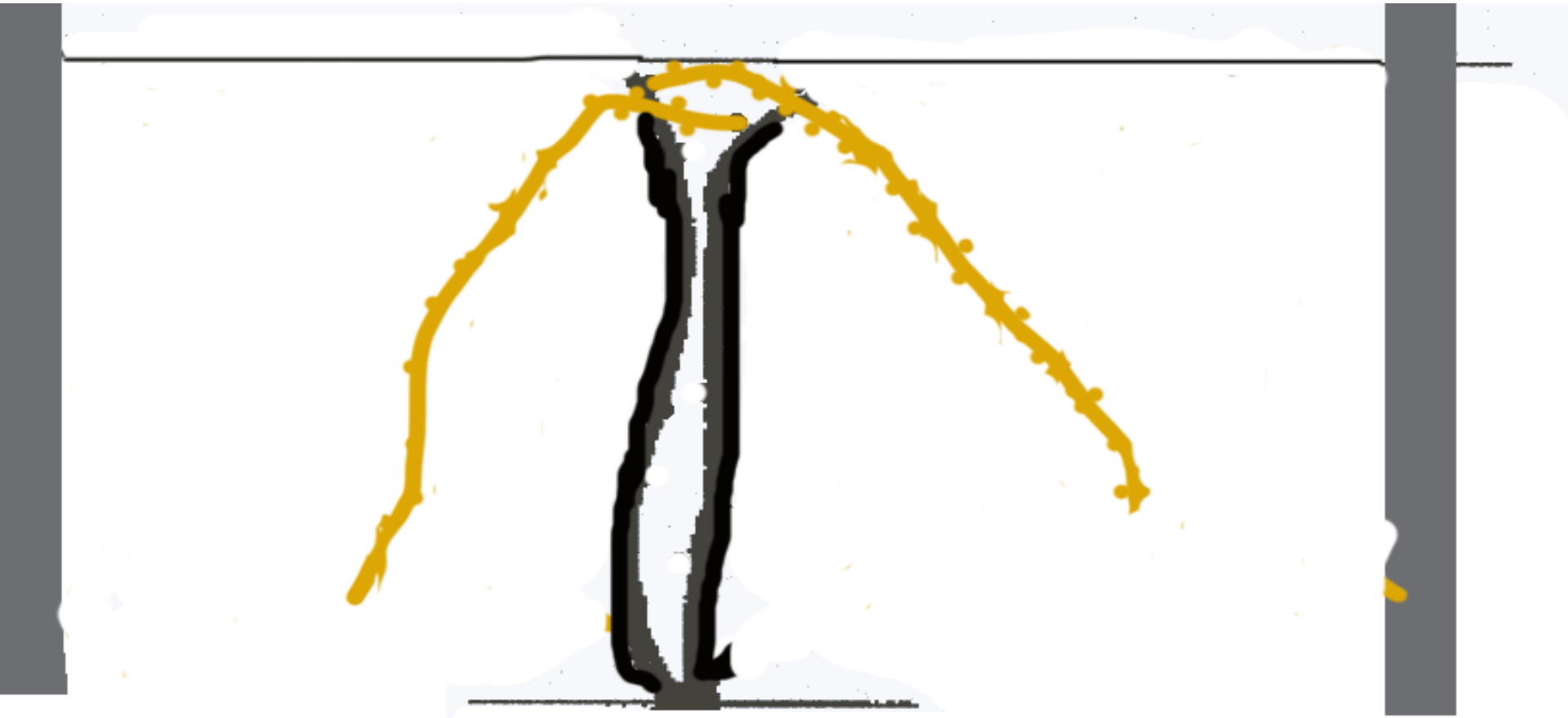
High Cordon Growth, Training & Pruning

- **Mature canes after harvest & fall leaf drop**



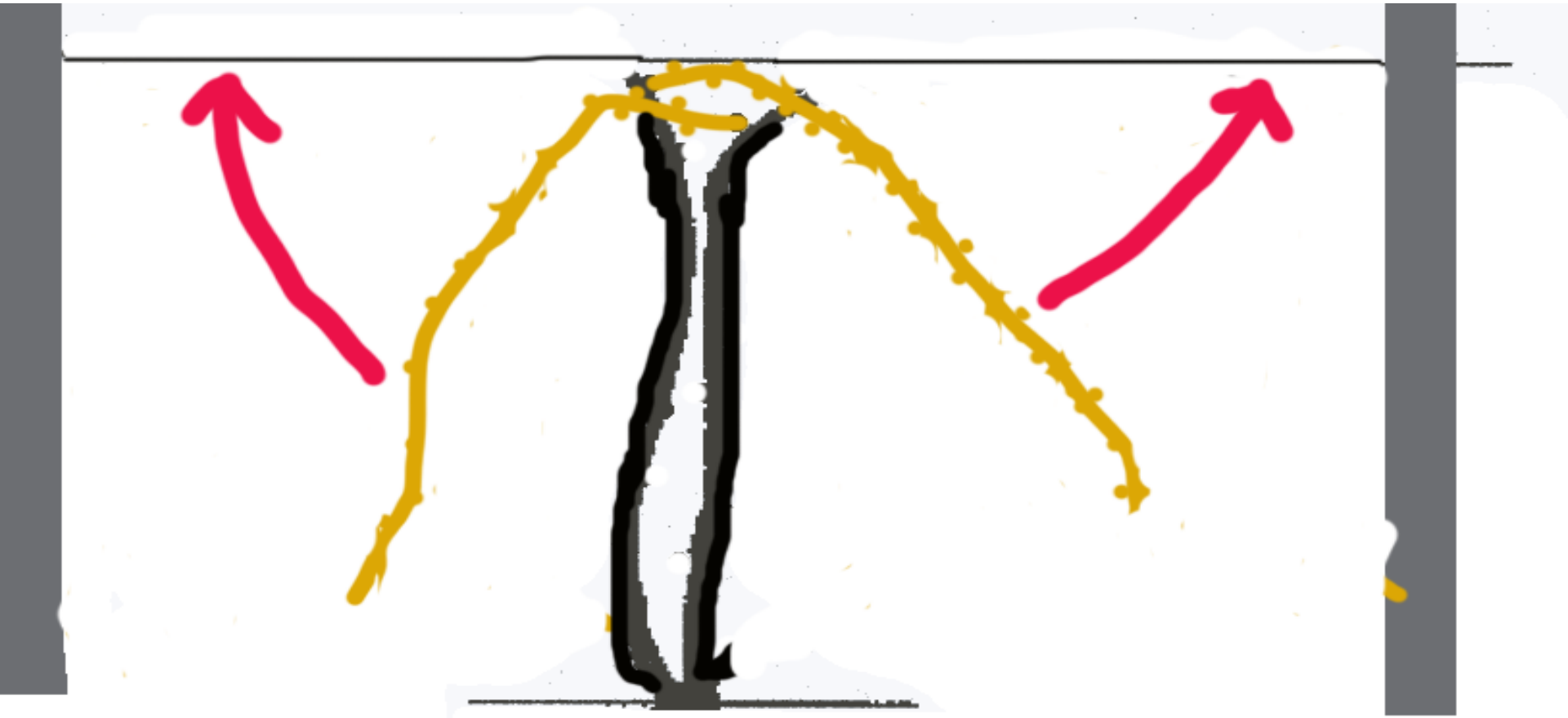
High Cordon Growth, Training & Pruning

- **2nd bearing season – long cane pruning**



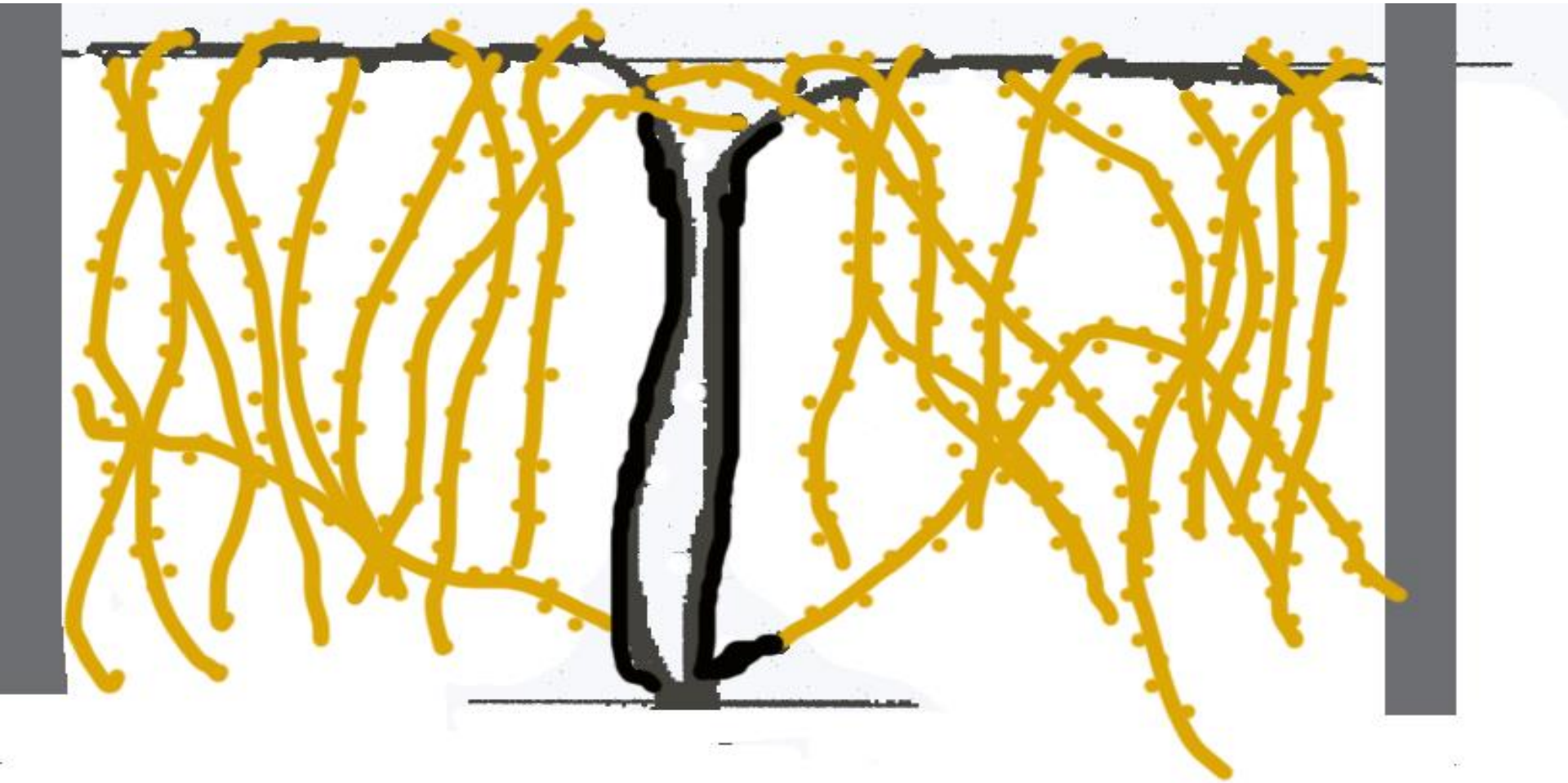
High Cordon Growth, Training & Pruning

- **Renewing the system with long canes**



High Cordon Growth, Training & Pruning

- **Mature canes after fall leaf drop**



High Cordon Growth, Training & Pruning

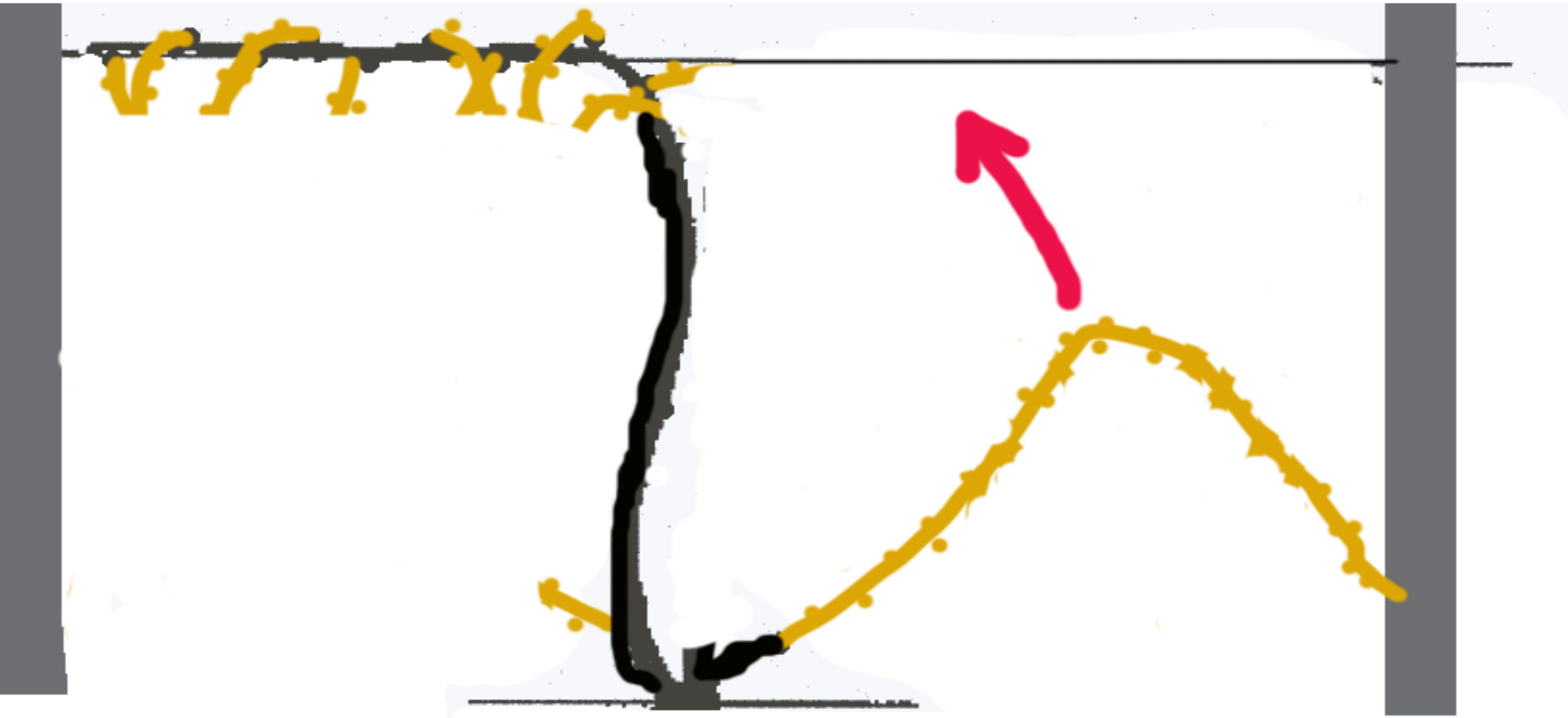
- 2nd bearing year – spur pruning
- Adjust crop by number & length of spurs

High Cordon Growth, Training & Pruning

- **2nd bearing year – spur pruned**
- **Adjust crop by number & length of spurs**

High Cordon Growth, Training & Pruning

- **Replacing injured trunks as needed “spare parts”**



High Cordon Training

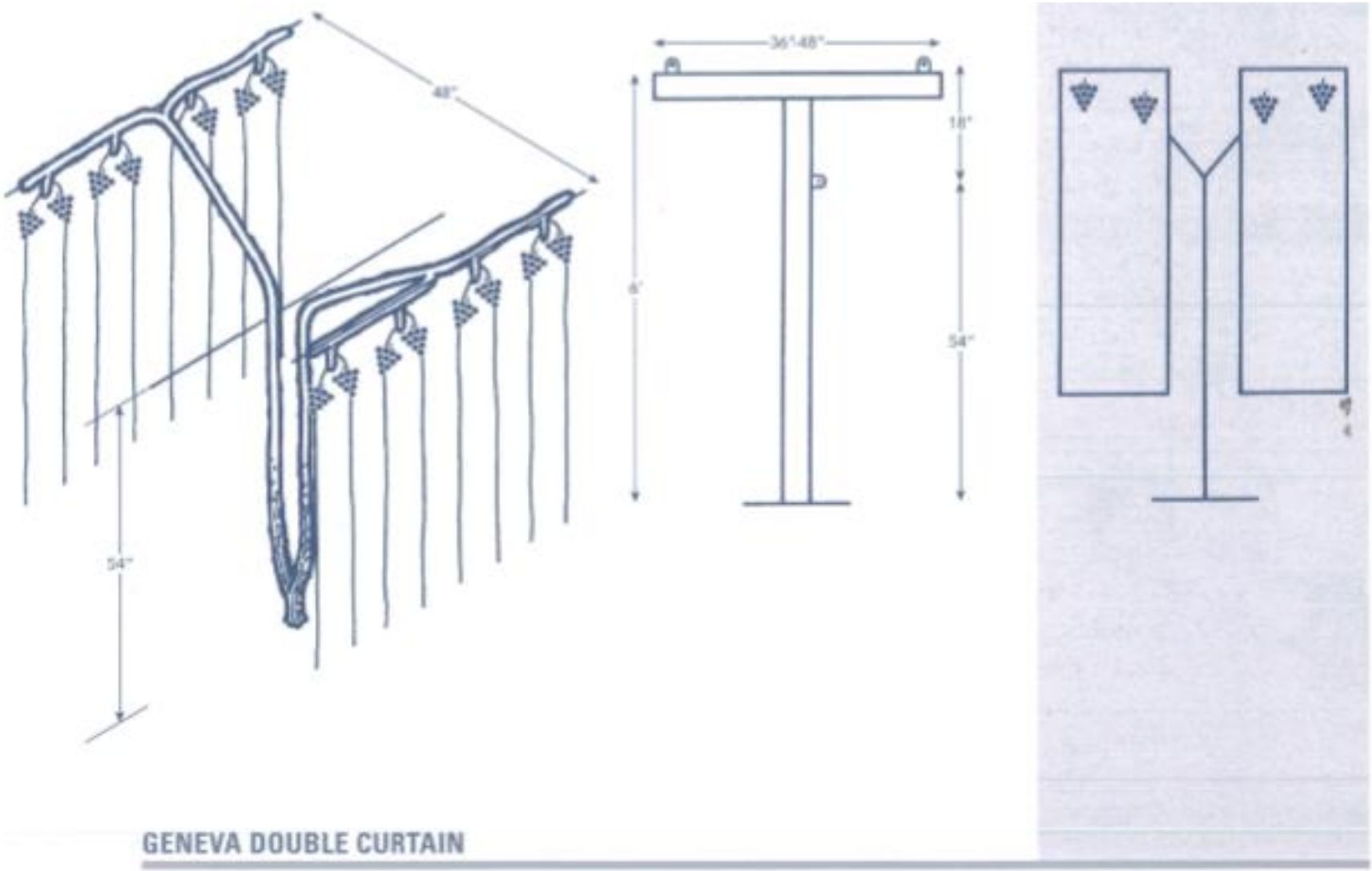
Advantages

- Adaptable to mechanical pruning, harvesting, and unskilled manual pruning
- Excellent sun exposure
- Simple trellis construction
- Little or no annual tying
- Reduces vigor

Disadvantages

- Difficult cordon establishment
  - winter injury
- Difficult cordon removal
- Old cordons may become a reservoir of diseases

Geneva Double Curtain



Geneva Double-Curtain Training

Advantages

- **Handles large canopies of vigorous vines**

Disadvantages

- **Similar to Top-Wire Cordon, but more difficult to maintain**

Training Systems for Upright Vines

- **Guyot, AKA “VSP”**
- **Mid-wire cordon**
- **Pendlebogen**
- **Fan**
- **Divided canopy systems**