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**TDC/EED
TRADE DEVELOPMENT CENTER PROGRAM
EXPORT ENTERPRISE DEVELOPMENT
PROJECT**

**BASIC PRODUCTION GUIDE
FOR EXPORT GRAPES (EGYPT)**

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Basic Production Guide
for Export Grapes (Egypt)

J. Domingo Godoy H.
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Thompson Seedless Model

1. Trellis and Planting Distance

a. Goals: Largest interference to the sun light and getting loose hanging clean bunches under the canopy for trimming and easy handling spraying, dusting, more disease resistance by natural ??? of the berries and less susceptible to dehydration.

b. Soil Type:

Heavier soil (delta) later harvest varieties and larger planting distance like 4 X 4 in a Chilean Pennon Trellis with one or two plant per stake. Also 4 X 3 in telephone trellis (T) "Y" trellis. Expected higher yields.

Sandy soil (desert): Primarily earlier harvesting varieties and some mid ??? varieties in a Chilean Pennon Trellis 3.5 X 3.5 or 3 X 4 with two plant per state. Also 4 X 2 in a T or double T and "Y" trellis, expected lower yields.

2. Irrigations Systems: Capacity 50% more than Errepotrans piration (ET) for leaching salts.

Heavier Soils : May use for manly ferrous or drip irrigation with one line.

Sandy Soils: Double drip line or microjet.

3. Windbreak: Absolutely necessary on the desert to reduce wind damage, cost of energy for pumping water by a reduction in transpiration and salt toxicity to the plant . May use Casuarine planted in double rows surrounding each plot. Prune them in winter to keep lower vegetation tractor (60-70Hp).

4. Machinery: Should be adapted for the distance planted and power capacity to carry on a sprayer with fan that more between 60.000 to 80.000 m³/hour. The sprayer need an horizontal or perpendicular bar with nozzles delivering 100 liter per minute. Powder dust sprayer for dust applications after flowering. Subsoiler or Chisel to get to 60 cm to 100 cm down. Bush shredder for the canes left in the ground after pruning in order to increase organic matter in the soil. Evaporation to measuring evape. transpiration daily under field conditions for scheduling the irrigation.

5. Dormancy: Grape vines need a short period of rest without leaves and continuous low temperatures (below 7 degree calcium), short days and darkness in order to restore a new cycle of growth. in a warmer climate you need to break dormancy by compounds like ??? potassium nitrate plus oil, dormex plus oil or dormex alone (hydrogen ciananido or calcium ciananuido). Table grapes have been sprayed successfully with dormex 5% plus a surfactant, 30 to 60 days before normal budbreak, depending on the variety and objectives.

It is important to remove leaves at least a month before dormex, irrigate the soil in order to hydrate the plant and prune closer to the spray. Also to spray thoroughly to dripping point. Dormex for uniformity budbreak should be sprayed 30 days before normal budbreak; also in varieties like Ribrer where you need uniform flowering for good settling and on late harvest varieties. Roots do not have dormancy, only rest depending on water ability in the soil and soil temperature.

6. Irrigation: Roots need to be kept nearly field capacity where the water is easily taken by the plants through root pressure or transpiration but without affecting the normal aeration of the soil for root respiration, and oxidization of iron, zinc, manganese and others. The period between blown and 20 days after is considered the most important event due to cell division of the ovule recently fertilized and need water at field capacity all the time to get the largest number of cells and a potential for larger fruit. This will help to leach salts out than the root zone for potassium and nitrogen fertilization after settling of the berries.

The other period important to have field capacity is the one in autumn before nitrogen fertilization end of September, in order to leach salts. Before dormex application it is important to hydrate the plant which has been without water for one month or more in order to drop leaves and stress the wine to go into dormancy. You may apply around 1.000 m³/Ha depending on the soil type.

It is necessary to know the storage capacity of each soil type to a depth of 1 meter or more this is a measure of volume of water between Field Capacity and Wilting Point. Also, it is required in uniform areas an evaporation pan to have the reading of the evapotranspiration lost daily in order to restore the amount of water lost.

7. Fertilization and nalt to Toxicity: Grape responds to manure developing a root system and getting the required balance between microelements due to a maintenance of a lower PH. It is advisable to apply every year between 3 to 10 Ton of decomposed manure, localized under the soil where the root system has developed. You can add to the manure the required microelements like iron, zinc, and manganese as a sulfate salt.

Visual symptoms and petiole analyses at full bloom are excellent for diagnosis of plant nutrition status analyzing N-NO₃, N-NHY, P, K, Ca, Mg, Zn, Fr, Mn, CN, B, Na, Cl. Most of the vineyards show high or toxicity of N-NH₄, low K, Zn, Fr, and toxicity of Ne. and Cl. The Nitrogen toxicity as ammonium nitrogen is expressed as cluster brownish and dry shoulders, low fertility of the buds, water berries and a ??? salts on the margin up the upper margin part of the blade.

Add between 80-120 units /N/H₂ a year with 70% in autumn and 30% after berry set in full production plants fertilization. Potassium is required by the plants to regulate its transpiration and cooling by stomatal movement through water potential difference in the cell gerards due to K⁺ ions. These cooling effects reduce the sun damage, increase berry size and it improve the crispiness of the berries. Must be applied in autumn (70%) and after berry set (30%).

Zinc and iron difference are being caused by high PH of the soil due to calcium carbonate and radium chloride. Both are affecting the potential growth of the berries and should be corrected by lowening the PH with acid, sulfur and sources of fertilizer containing sulfates

or adding ?? forms to the soil or foliage before bloom. Also painting the pruning cuts with zinc sulfate (24%) 180 grams/100 lts of water just after earthing.

Sodium and chloride toxicity always go together and should be leached with water, prior to a subsoiling in between rows in autumn in order to break the strata of the soil. Soil and water analysis for salinity of CO_3^{2-} - HCO_3^{-1} - SO_4^{2-} - Cl^{-1} - Na^{+} - Ca^{++} , Mg^{++} - B- SAR (Sodium exchange rate) - EC and PH will help to understand and correct problems.

8. Pruning: Is the removal of part of the annual growth in order to have stronger, uniform, well spaced fruit wood in late autumn or winter. The fruitwood needs to be mature, round and average growth, exposed to the sun the previous season. A bud analysis under a binocular (200+) will help on the decision of the pruning according to percentage bud fertility, and position of flower buds in the cane. Thompson Seedless variety generally produce ?? in well sun exposed canes between the six and the twelve bud from the ??? one year old wood and sprouts an older wood if they have been sun exposed pruning.

I believe you should wire up more the head of the plant and leave upper fruit wood in the second wire of the "Y" system and well distributed canes. Also leave more canes per plant between eight to ten according to the planting distance. The spurs in a well managed Thompson are not necessary and in general cause more shade and to strong and shredded wood, that would not be fruitful.

9. Weed Control: Weeds do compete for water and nutrients with the wine, but perennial weeds will cause ALELOPATHY against the grape plants, due to an inhibition effect on root growth. There can be control with glyphosate 1-2% at PH 4-5 and with the lower amount of water, taking in consideration the precaution, this compound has due to its phytotoxicity to green parts of a plant .

10. Insects and Pesticides: The insecticides have to be used under label recommendations, taken in account the residue in the fruit at the harvest time in accordance with the respiration and tolerance levels in the fruit for the country where to be exported.

Some insects are considered under ??? time requirement for a given country and the fruit has to be free of that insect or has to be fumigated with ??? or receive a cold treatment previous its shipment (Mediterranean fruit fly).

The main problems I have seen can be easily control at bloom time or earlier with organophosphate compounds like Dieldrin (14 days before harvest), azinphosmetil (28 days b.h.), Chlorpyrifos (20-45 days b.h), Dimethoate (20 days), phosmet (7 days b.h.); else pyrethroids compounds. These can be mislabeled with the GA for thinning and a fungicide and insects and pesticides.

After flowering you can only apply safety without unsting the fruits wettable powder formulations as a dust sprayer with Sulfur Dust (mesh 325 micron), apply with temperatures lower than 26 degree Celsius, until the berries begin to show color or softening.

I have seen badly russet berries with EC compounds and/or Triton B applied after setting the main insects are flower and European ??? a kind of moth, that affects clusters as warm stage and an ominous leaf roller. Also it will increase the mealy bug under the outer bark

and in the clusters at harvest giving a stiday appearance. There may be some European brown seale in the leaf, cluster and canes and t??? cane ??? and mites.

11. Diseases: The main disease is Botritis and will be always us a potential problem, depending on the environment, temperature and free water on the top of the berries, increasing use they get over 40% soluble solids. It can be broadcart with an ENVIROCASTER (Neogen Corporation, 620 Leshar Place , Lansing Michrigan 48912-1509-517/372-9200). There is importance to protect the flower stage against guiescent disease (latest in the berries), also after trimming the brunches, at softening of the berries or turning color, before harvest and during post-harvest and storage.

I would advise to spray with the second GA for thinning Rowal or Ronilan plus and insecticide and repeat 2-3 days before harvest dust with sulfur dust or diseases. As Rovel 4F applied with 800lts/water per hectare and small drops with a bloomer. The post-harvest is advisable to gassify with SO₂ gas 0.25-0.5% volume\volume during 10-20 minutes and add to the box a metabisulfidepad with 5 grams per bx of 5 Kgs. The other important disease is Powdery mildew that develops always on grape leaves, shoots and clusters. The best way is preventivection by a wetable sulfur for 3 items every 15 days before bloom; then a Bayleton (triadimefon), (Myclobutessil) or any sterol inluibrtor, with the second GA for sizing and continue only with sulfur dust (mash 325) every 7-10 days up to softening of the berries with temperature before 25 degree calcium . It is possible to continue with sterol inhibitors, the risk of developing resistant is very high. Gray mildew or Downey mildew I don't have the experience because is not in Chile.

12. Girdling: Is a technic used to increase berry size and consist of taking out a peace of bark (floem). (1-5.5mm) around the trunk without damaging the wood (x-y less). Has to be done after completion of shattering (berries thinning or drop). If you do it earlier you get uneven berry size and if it is to late will increase less the berry size. It is advisable to add more water during these period and cover the wound with aluminum foil in order to have a letter heading girdling.

If you go to deep in the wood, you may kill the plant or effect next year clusters formation. The width should be 3 mm (1/8") and without any bridge of bark.

13. Hormones:

Thomson seedless grape have to be spray with fiberlic Reid for the thinning and sizing. No final effect on elongation and this has been the main problem, because a larger amount than 10 ppm cause clusters to be brittle and curled or twisted and uneven berry size. The reommendation is :

a. Thinning 1st GA 10ppm when you see the first caliper split in the ???. If temperature are high it takes only few hours to go into flowering and you do not have the thinning effect. It is advisable to add 20 units of Nitrogen/H₂' week before to the soil.

2nd GA 10 ppm repeat 2-3 days after.

3rd GA 10 ppm repeat 2-3 days after the last two elongate the berries, the first thinned better bit you get rounded berries.

You can add inredicide Wetable Powder and fummigized to the GA apply 1.500 to 2.000 lts/H₂' of water and spray clusters and foliage harmonies.

b. Lizeing:

1st GA for berry growth between 4.5-5.5 mm berries diameter. But shatter should be completed if not you will not get uneven berry size. Dozage 30-40 ppm in 2.500-3.000 lts\H₂. This is can be miscture with B2y to L2n.

2nd GA for berry growth: 3-4 days later, depending on the temperature. Dozage 30-40 ppm in 2.500-3.000 lts\H₂'.

3rd GA for berry growth: 3-4 days later. Helps when you have ?? flowering and covers the last flowers. Some dozage and water.

13. (Hormones Continues)

Other sintetic "hormone like" responce on cell division is the CCPV or CAPLIT (Trade names) or Forchlorfenuron (N - (2 - CHLORE - 4 - PYRIDINYL) - N - PHENILVREA, that comes at 0,1% EC active ingredient.

This hormone is under research and trial and should not be used until register in the market where the fruits are going to be shipped.

The effect on Thompson seedles is a larger berrie size with a pear shape, greener berries, and dryer ones; but de-layed on harvest has been shown.

There is sinergistic effect when used in combination with the first GA for sizeing.

The dosage under trial is between 7 to 15 p.p.m. of active ingredient, between 5 to 8 mm. berrie size. But some russeting on the berries and larger lenticels has been under concern.

14. Nematodes

These are smal organisms that feed on the roots, inter-nally and externally. They damage badly the root systems reducing the capacity of K absortion through feeder roots

and water mainly. Also ^{2re} the viruses transmitted organisms.

They grow on weeds and vines and their population varies according to soil water level and temperatures.

There are also saprofitic nematodes that increase with manure applications that contribute to natural control of the plant parasite nematodes.

It is necessary to sample soil and roots to understand their levels and their economical control with nematocides like Nema-cur, Furadan and some new organic compounds. Its use has to be under the knowledge of residual effect of the fruit.

x In general, can be used in late summer or ^uAutumn before leaf drop and early in the season when shoots are 30 to 50 cm. long.

x 15. Plant Management²

I. Deshooting: when shoots are 20 to 40 cm. long it is necessary to take shoots out of the trunk and main scaffolds arms to open the structure for sunlight and less interference on the clusters later on. Also, take out the secondary shoot of a bud without clusters and spaced the shoots leaving mainly those with clusters.

II. Tying shoots with clusters in order to spaced them and leave the clusters hanging loose.

III. Deleafing around the clusters and taking the tendrils out of the cluster and shoots that interfere with a normal hung loose cluster.

This is the moment when you can thinned some clusters that are on weak growth, carrot type or malformed.

The timing is before flowering in order to get with the hormone spray easily to the clusters. Also, repeat after shattering for better exposure of the cluster to the giberelic acid for growth, and let the cluster hanging loose.

Do expose the cluster by steps to the light in order to avoid sunburn and favour waxiness formation around the berries.

IV. Do not touch the plant between flowering and end of shattering or you will get uneven berry size.

V. Trimming and shaving clusters in order to let space for the berrie growth, allow waxiness formation that reduce sunburn and later dehydration of the bunch after harvest. Also, reduce the incidence of rot (Botritis), because of the microenviroment around the clusters and berries will be dryer and ventilated.

The trimming has to be done after shattering and before the

berries get to large and the cluster compacted, where you will cause mechanical damage to the berries. Ideal 7 to 10 days. It can be done in two stages:

- a. Cleaning shoulders and
- b. Shaving the upper shoulders underneath them.

The shoulders on a long shoulder cluster (larger than 8 mm.), can be worked out easily leaving 5 shoulders on the upper portion and taking out 4 shoulders and then leaving 3 at the tail and cut.

On a carrot type cluster leave 4 shoulders, take 3 out, leave 3, take 3 out and finally leave 3 shoulders and cut.

There is another way but requires more skill; there you cut the length of the cluster from the upper first shoulder to a long of 13 or 14 shoulders out and take shoulders out to the tail in a random spiral form. The shaving under the upper shoulders can be done at the same time or later and depends on the thinning effect of the G.A. and consists on shaving out all the berries that hung underneath the upper shoulders.

16. Harvesting

Has to be done when the soluble solids reaches 16^o Briggs or when the soluble solids/acid ratio reach 20:1.

Lower maturity means less flavor and market reject; also

the susceptibility to dehydration, freezing and SO₂ damage increases.

The fruit has to be packed and lowered the temperature in faster as possible or the berry shatter will increase in the box and larger dehydration of the raquis.

17. Gasification with SO₂ gas will clean up the surface of the berries reducing the risk of rot damage. The dosage and time of exposure should to be studied; but I will recommend to study between 0,25 to 0,5% volume/volume during 5 to 10 minutes depending on the air movement on the gas chamber. There are some varieties, mainly those with color that are more prone to bleaching, and those damage berries with hairlines.

18. Quality Control: has to be undertaken in order to have a uniform product to the market.

The main points are, standard weight of the box, minimum bunch weight, maturity, berry color and size uniformity, and bleaching.

19. Precooling and storage has to be done fast after harvesting without freezing the berries and reducing the dehydration. The temperature should reach 0° to 2° Celcius in

the berry depending on the capacity to reduce the temperature of the storage room where you should get 0° Celcius permanently $\pm 0,5^{\circ}$ Celcius depending the soluble solid concentration and its freezing point.

The fruit should be kept at this temperature all the way to the consumer.

20. Trouble shooting different orchards:

I Hegazy

Dormex was applied in a brush and tough point with good results.

No deshooting and tying shoots, should be done after harvest; this will affect flower formation for next season. Obtain less uniform bunches and difficult to spray, trimm and harvest with more russeted berries.

GA for thinning did not work and will result in tied clusters and shoulders.

The GA for elongation had bad side effect.

Girdling was done too deep in some plants and without sharp blades causing a shell of bark released. The aluminium foil covered later than 7 days after girdling delaying the healing effect. Difficulties to heal and may affect clusters

formation for next season.

Some salty areas that have to be treated.

Good manure application, bunch trimming and berry size with the earliest harvest for Thompson.

They showed one of the largest interest on the visit and understanding.

The Ruby were trimmed and deleaf before end of shattering expecting ununiform berry size.

The Exotic look good but to much vigor, as also Ribier which set well due to reduction in vigor during flowering because were not watered for 15 days.

The Flame were not worked out, but they have the knowledge to produce the earliest and good quality for the next season.

On peaches we discuss dormancy breakbage and showed the summer prunning after harvest, future girdling and iron treatment in order to get earlier and larger fruits.

II Zawbas

Excelent orchands, well maneged but to much vigor, due to excess nitrogen and on Thompson the worst result due to

two sprays at high dosage of GA. for cluster elongation.

Girdling in one of the orchards done too deep and and dangerous for the plant.

Flame and Ruby very promising with large crop.

Improving greatly with much interest on the visits; also covered peaches and apricots.

III El Beltagy/El Oseily

No GA for elongation on Thompson and ^good result on GA for thinning at the right time.

Girdling on canes is a chance when you have a weaker plant and was very well done at El Oseily.

Too much nitrogen and potassium deficiency.

Very uniform and well planned new plantings like Ruby, with excellent thinning due to 1 p.p.m. of GA at full bloom.

Good understanding and much interest to improve their management.

IV El Aguizy

Excellent facilities for cooling and packing, with much interest to improve.

Own orchards with some salt problems and young plantings with much interest on the trellis in order to get the best quality fruit in the future.

Young Parron Trellis with Flame in N^uberia with excellent quality and management.

The Flames from Osman Orchard of good quality but some russeting due to EC spray with 8 - 9 mm. berry size and bad trimming where did not spray GA for thinning in one plot. The other plot well thinned with GA 5 p.p.m. at full bloom would be of excellent quality.

The Egyptian Bank near N^uberia had Thompsons with low understanding, high salts and excess nitrogen problems on the bunches. The management has not been done at the right time.

Other Thompson orchard of excellent development but killed clusters with high GA for elongation, berries ununiform size, brittle and tight clusters teach how to train young peaches.

V Eissa

Thompson with good management and opportunity of labors. Some late trimming of the clusters that turn out in mechanical damage of the berries.

Excess nitrogen and salty areas, zinc deficiency, but good understanding of the management. Will get good quality grapes.

The GA for elongation was late and reach the perfect time for thinning berries resulting in excellent loose clusters and potential large berries.

The best understanding and practice of the girdling.

No knowledge on Flame and Superior should be improved.

VI Niazy

Short one visit around different species.

The main problem is lack of water per plant and break dormancy in stone fruits.

Good thechnical support on grapes and opportunity of work.

We developed a "Pert of Activities" o Thompson through

the season with the labor yield through his computer.

VII Korra

The best understanding and follow up of the management on Thompson Flames and Rubys. We also covered the management of Perlettes and Superior.

Dormex was not applied properly resulting in very un-uniform flowering and hard to decide the timing of the labors and sprays.

Liquid sprays when berries were 5-6 mm. did damage badly the cluster; it seems to be TRITON surfactant the one that causes the damage or the combination with TOPAS E.C. concentration . I have been using instead Captan-Benlate at the flowering stage and Rovral or Ronilan as WP formulation with out damage to the flowers. But after setting only the GA plus Bayfolan or Bayleton; from then on only blow sulphur dust plus a given insecticide or funjicide as WP (Watable Powder) formulation, but only as DUST with the sulphur dust in a BLOWER

VIII El Shiaty

Only one variety in a large orchard. I would never recommend that variety in an early area in a so large surface

planting.

The way to aproach today is trying to have through manegement different harvest time using tools like dormex, girdling, deshooting, thinning clusters and combinations of them.

They had one of the best understanding and interest on Ruby management to produce a uniform commodity for a long period of time.

IX Diab

Did not show up in two oppotunities and neither phoned to advice.

Basic Production Guide For Export Grapes Page 1**Source: Domingo Godoy .H.****Date: April-May 1994****File: 940523a****Topic: Thompson Seedless Model****1a. Trellis Goals:**

- o To protect bunches from direct sun light.
- o To have loose hanging clean bunches under the canopy for trimming and easy spraying, dusting, more disease resistance by natural berry waxiness and less susceptibility to dehydration.

1b. Planting Distances:

- o In heavier soil areas (delta regions) where late maturing varieties are present, planting distance should be 4x4 meters in a Chilean Perron trellis format with one or two plants per stake. For Telephone (T) trellis format, the planting distance should be 4x3 meters. (T) trellis formats tend to produce less crop than the Perron format.
- o In sandy soil areas (new desert regions) where production is earlier than the delta areas, planting distances for the Perron Trellis are 3.5x3.5 meters or 3x4 meters with two vines per stake. With a (T), double (T) or (Y) trellis format, planting distances should be 4x2 meters.

2. Irrigation Systems:

- o The irrigation network should have a capacity 50% in excess of Evapotranspiration (ET) to allow for leaching.
 - On heavy soils, irrigation can be furrow or single line drip system.
 - On sandy soils, twin row drip or a microjet system should be used.
- o Roots need to be kept near field capacity where the water is easily taken up by the vine through root pressure or transpiration without affecting the normal soil aeration essential for root respiration, and the oxidation of iron, zinc, manganese and other elements.
 - The period between bloom to 20 days after is considered important because cell division of the recently fertilised ovule occurs. It requires that irrigation is kept at field capacity to increase cell division which eventually will result in a larger berry size. Maintaining irrigation at field capacity will keep salt buildup as a result of earlier fertiliser application away from the root system.
 - The second period where irrigation should be kept at field capacity is during the autumn months before the September fertilisation in order to leach accumulated salts from the root ball.
 - Finally, irrigation should be applied prior to dormex spray and after the reduced irrigation period necessary for induction of leaf drop and vine dormancy. Around 1,000 m³ / Hectare depending on soil type. It is necessary to know the storage capacity of each soil type to a depth of one meter or more. This is a measure of stored water volume between field capacity and wilting point. Evapotranspiration measuring equipment (evaporation pan) are necessary to measure daily water losses necessary for compiling irrigation budgets.

Domingo Godoy Grape Advisory Visit To Egypt (April-May 1994)**BEST AVAILABLE COPY**

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3. Windbreaks

- It is absolutely necessary within the desert areas to reduce wind damage, which is responsible for higher evapotranspiration and increased salt uptake within the vine. A double row planted Casuarina hedge on the parameters of each vineyard will achieve good windbreaks. Casuarina trees should be winter hedged and topped to maintain a dense canopy.

4. Machinery

- The machinery used should be compatible with the vine planting distances. Too big a tractor will make manoeuvring within the vines difficult while too small a tractor will not be able to handle the 60 to 80 m³/hour fan sprayer necessary for vineyard spraying.
- ◆ Sprayers should have vertical or horizontal bars with nozzles delivering around 100 liters/minute.
- ◆ Dusters should be used as the means of pest and disease control after flowering.
- ◆ Subsoilers or chisels should be used to breakup soil layers from 60-100 cm within the ground.
- ◆ Brush shredders should be used for creating mulch from pruned canes thus increasing the organic matter in the soil.
- ◆ Evapotranspiration measuring devices should be used to monitor daily water losses and aid irrigation scheduling.

5. Dormancy

- Grape vines need a short dormancy period without leaves and a continuous low temperature (below 7 degrees Celsius), short days and long nights in order to restore a new growth cycle. In warmer climates, this can be achieved by spraying compounds like Thiourea, potassium nitrate and oil (5% plus 3% oil), dormex and oil or dormex (hydrogen cyanimide, calcium cyanimide). Table grapes have been sprayed successfully with 5% dormex plus surfactant, 30 to 60 days before normal budbreak, depending on the variety and objectives.
- Vine roots do not go into dormancy, they only go into a rest period which is dependent of soil moisture availability and soil temperature.
- Dormex:
 - ◆ It is important to remove leaves at least one month prior to dormex spray.
 - ◆ Irrigation to hydrate vines prior to dormex spraying.
 - ◆ Dormex should be sprayed 30 days before normal bud break to achieve uniform bud break on varieties like Ribier where you need uniform flowering for good setting.

6. Fertilisation and Salt Toxicity

- Grape vines respond well to manure application. It promotes better root development and makes available microelements due to maintaining a lower pH. It is advisable to apply 3 to 5 tons of decomposed manure per hectare on a yearly bases. It should be localised under the soil where the root system has developed. Addition of iron, zinc and manganese sulfate to the manure is advantageous.
- Visual symptoms and petiole analysis at full bloom are excellent for diagnosis of plant nutrient status (N-NO₃, N-NH₄, P, K, Ca, Mg, Zn, Fe, Mn, C, B, Na, Cl).

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Most vineyards visited showed high levels of N-NH₄, and low levels of K, Zn, and Fr while there was a toxicity of Na and Cl

- Nitrogen toxicity as ammonium nitrogen is expressed as cluster brownish and shoulders, low fertility of the buds, water berries and whitish deposits on the margins of the leaf blades.
- Fertilisation of fully mature vines should include 80-120 units N per hectare with 70% in autumn and 30% after berry set. Potassium should also be applied on the same 70-30% ratio. Potassium (K⁺ ion) regulates vine transpiration and cooling by stomatal movement through water potential difference in the cell guards. This cooling reduces the sun damage, increases berry size and improves the berry crispness.
- Zinc and Iron deficiencies are caused by high soil pH, the result of the presence of high levels of calcium carbonate and calcium chloride. Both compounds affect the potential growth of the berries and should be corrected by lowering the pH with acid, sulfur and sources for fertiliser containing sulfates or adding chelate forms to the soil or foliage before bloom. Painting the pruned cuts with zinc sulfate (24%) with 180 grams/100 ltrs of water is also affective.
- Sodium and chloride toxicity always go together and should be leached with water prior to a subsoiling operation. Subsoiling should be done between the vine rows in the autumn to break the soil stratas. Soil and water analysis for salinity control of (CO₃⁻², HCO₃⁻¹, SO₄⁻², Cl⁻¹, Na⁺, Ca⁺⁺, Mg⁺⁺, B, SAR(Sodium Exchange Rate), EC and pH) will help to understand and correct problems.

7. Pruning

- Pruning during the autumn or winter period is the removal of part of the annual cane growth in order to have stronger, uniform, well spaced fruiting wood.
- The fruiting wood needs to be mature, round and of average growth and most important, exposed to the sun the previous season.
- A bud analysis under a microscope (200x) will help with the pruning decision based on the percentage of bud fertility and flower position on the cane.
- Thompson seedless variety generally produce clusters in well sun exposed canes between the sixth and twelfth bud from basal one year old wood and sprouts and older wood if they have been well exposed to the sun.
- I believe you should raise the vine head and leave the upper fruiting wood on the second wire of the (Y) trellis system. Leave from 8 to 10 canes per plant according to vine planting distance. The spurs, in a well managed Thompson variety, are not necessary and in general cause more shade which produces wood that is not fruitful.

8. Weed Control

- Weeds compete with the vine for water and nutrients and should be controlled. Perennial weeds cause Allelopathy and inhibit vine root growth. Control with glyphosate at 1-2% with a solution pH of 4-5 will control weeds well. Attention should be given not to spray green vine foliage.

9. Insects and Pesticides

- The insecticides have to be used under label recommendation, taking into account the residue on the fruit at the time of harvest and also in accordance

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- o Girdling is a technique used to increase berry size and consists of taking out a piece of bark (phloem), 1-5.5mm wide, around the trunk without damaging the wood (xylem). If you cut too deep in the wood, you may kill the plant or affect next year's cluster formation. The width should be 3mm (1/8") and without a bridge of bark, Girdling has to be made after completion of shattering. If you girdle earlier, you will get uneven berry size and if the girdling is too late, the potential increase in berry size will not be achieved. It is advisable to increase irrigation during the girdling period along with covering the wound with aluminium foil in order to achieve better healing.

12. Hormones

Thompson seedless grapes have to be sprayed with GA for thinning and sizing. Spraying for cluster elongation is not effective and adds to increased GA levels beyond the 10ppm required within the cluster causing clusters to be brittle and curled or twisted and induces uneven berry size.

- o **Thinning**

- First GA spray for thinning (10ppm) when you see the first calliper splitting in the vineyard. If temperatures are high, it takes only a few hours to go into flowering and you do not achieve the thinning required. It is advisable to add 20 units of nitrogen per hectare one week earlier to the soil.
- Second GA spray for thinning (10ppm) 2 to 3 days after first spray.
- Third GA spray for thinning (10ppm) 2 to 3 days after second spray.

You can add insecticides (wettable powders) and fungicides to the GA spray and apply from 1500 to 2000 liters water/hectare and spray clusters and foliage.

- o **Sizing**

- First GA spray (30-40 ppm in 2500-3000 liters water per hectare) for increasing berry diameter from 4.5-5.5 mm. This spray can be mixed with Baylatone.
- Second GA spray (same as first) 3-4 days after first spray depending on the temperature.
- Third GA spray (same as second) 3-4 days after second spray helps when there is uneven flowering.

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with respiration and tolerance levels in the fruit for the country where the fruit is to be exported.

- o Some insects are considered under a quarantine time requirement for a given county and thus the fruit has to be free of that insect or has to be fumigated with methyl bromide or receive a cold treatment previous to its shipment; (Mediterranean fruit fly). The main problem viewed can be easily controlled at bloom time or earlier with an organophosphate compound like:
 - Diezinon (14 days before harvest),
 - azinyphosmetil (28 days before harvest),
 - Chorphiphos (20-45 days before harvest)
 - Dimethoate (20 days before harvest)
 - Phosmet (7 days before harvest)
 - Pyrethroid compounds

These compounds along with fungicides can be mixed with GA for thinning.

- o After flowering, you can only apply wettable powders safely with sulfur dust (325 micron) without the problem of fruit russeting. Emulsifiable concentrates breakdown the berry waxy layer. I have seen badly russeted berries with EC compounds an/or Triton B applied after setting. The main insects are flower and European thrips, moths that affect clusters at the worm stage of ominous leaf roller. It will increase the mealy bug under the outer bark and within the cluster, giving a sticky appearance at harvest. Apply with temperatures lower than 26 degrees Celsius until the berries begin to show colour or softening. There by be some European Brown Scale, cane borer and mites on the leaf, cluster, canes and twigs.

10. Disease

- o The main disease is Botrytis and will always be a potential problem, depending on the environment. Temperature and free water on the berries along with the increase in berry soluble solids (over 40%). Botrytis can be monitored via an Envirocaster (Neogen Corporation, 620 Lester Place, Lansing Michigan 48912-1509 Tel: 517 372-9200), There is a need to protect the flower stage, and later the berries, against quiescent diseases. Bunches are also susceptible after bunch trimming, at the berry softening or coloring stage and before during and postharvest stage
- o Spray Roval or Ronilan plus insecticide with the second GA for thinning
- o Repeat 2-3 days before harvest by dusting with sulfur.
- o For post harvest it is advisable to gasify with SO₂ gas (0.25-0.5 % volume/volume) for 10-20 minutes and add to the box a metabisulfide pad with 5 grams per 5kgs carton of fruit.
- o The other important disease is powdery mildew that develops on the grape leaves, shoots and clusters. The best way to control is through preventive action by spraying three times with wettable sulfur, once every 15 days before full bloom. Apply Bayleton or any sterol inhibitor with the second GA spray for sizing. This should be followed by dusting with sulfur (325 microns) every 7-10 days as long as temperature is lower than 25 degrees Celsius, up to softening of the berries. Sterol inhibitors can be used yet the possibility of developing resistance is high. For control of Gray mildew or Downy Mildew, spray after harvest only or dust with sulfur and mancozeb or redomile.

11. Girdling

Domingo Godoy Grape Advisory Vist To Egypt (April-May 1994)

SCOPE OF WORK

Grape Production and Marketing Specialist (Short term)

A. BACKGROUND

USAID/Egypt has funded the Export Enterprise Development (EED) project with the stated goal to "promote Egypt's economic growth through expanded foreign exchange earnings," and with the purpose to "increase non-traditional exports produced by Egypt's private sector". In the document prepared by Chemonics International for USAID/Egypt, titled Strategy and First Annual Work Plan, "Grapes for Export" are targeted as one of the priority crops for immediate attention given the assumptions that a market already exists for this product, that Egyptian growers have production experience, and that there is potential for high impact in a short period of time.

Although there is production and export experience in Egypt for grapes destined for the local and Middle East markets, there is little experience with the varieties of grapes that are preferred in Europe, the main target market for this commodity.

B. STATEMENT OF WORK:

This short-term assignment is designed to provide the necessary guidance to the private-sector, grape growers in Egypt so that they can produce and harvest the appropriate grapes for the European market and enter that market successfully.

C. SPECIFIC DUTIES:

1. **CONDUCT GENERAL REVIEW OF GRAPE PRODUCTION:** The consultant, in coordination with COP (Chemonics Chief of Party) and representatives of New Desert Growers (NDG) group, will visit up to nine (9) grape production areas to review the available infrastructure, agronomic conditions and post harvest physiology. Where appropriate, recommendations will be given on-site to be followed by individual written recommendations before leaving Egypt. Basic production practices will be reviewed for field-grown grapes. A basic production guide for export grapes will be prepared, with separate recommendations for specific production sites.

2. **REVIEW QUALITY CONTROL GUIDELINES:** The consultant will review, with the relevant growers, and with staff of NDG and the Trade Development Center (TDC), the quality norms for grapes for European markets. This review will include guidelines for establishing quality control programs. Recommendations for implementation will be given relative to existing conditions. Where applicable, the review of quality norms will include pesticide residue tolerances and phytosanitary / quarantine restrictions.

3. ASSESS POST-HARVEST HANDLING:: Assess the available infrastructure for packing and post-harvest handling and make specific recommendations for improvement where applicable. As part of this review, advice and recommendations will be given on proper pre-cooling, packing and transport for export grapes.

4. REVIEW MARKETING PLAN: In conjunction with European marketing personnel already identified by TDC and NDG, review the marketing plan being developed, making comments and recommendations where applicable. Wherever information gaps are noted the consultant will provide the required information to the best of his ability and experience.

5. PROVIDE ON THE JOB TRAINING: Appropriate staff from NDG will be trained by the consultant in all of the processes mentioned above during the normal course of the assignment ("on-the-job" training) but not as individual training events.

6. PRODUCE FINAL REPORT: highlighting findings, conclusions and recommendations for increasing grape exports.

D. PLACE OF WORK:

Based in Cairo with routine, daily field travel to the grape production areas.

E. DURATION OF ASSIGNMENT:

Four person-weeks, to begin on or about April 19, 1994 and to be completed on or about May 18, 1994. A six-day work week is authorized, Saturday to Thursday.

F. REPORTING RESPONSIBILITIES:

The grape production advisor will report directly to and coordinate with the Chemonics Chief of Party/Management Advisor for EED, John R. Miller.

G. PROPOSED CANDIDATE:

Mr. Jose Domingo Godoy Huidobro has the appropriate background and experience with the production and marketing of grapes for export. He is a participant in a grape vineyard in Chile as well as an independent consultant. He has undertaken similar assignments throughout South America advising on the production and marketing of grapes for export. Mr. Godoy was also involved with the grape growing members of the New Desert Growers Corporation on their USAID sponsored mission to Chile at the beginning of 1994. The growers were so impressed with the methods and techniques of Mr. Godoy that they have requested his presence in Egypt to assist them in their final stages of production before their June 1994 harvest of grapes begins.