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MARKET ACCESS AND POVERTY ALLEVIATION 2 (MAPA 2)

TABLE GRAPE PROJECT

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I would like to thank Chemonics International and all the individuals that assisted me during my travels in Bolivia. The MAPA 2 Project's administration and dedication to the Grape Improvement Project is nothing short of impressive. Additionally, I would like to thank Enrique Rivas, Deputy Chief of Party for the MAPA 2 Project and Osvaldo Urquidi who were not only well prepared and punctual, but extremely professional. My respect goes out to them and all of the staff members.

GENERAL INTRODUCTION:

The purpose of this consulting trip to Bolivia was from my perspective three fold. Firstly, to become better acquainted with the different table grape producing areas located in the Southern region of the country.

Secondly, to evaluate field trials which were initiated as a result of last year's suggestions and grower sessions in Tarija (this season, due to higher than normal amounts of precipitation, has been particularly challenging for the growers in this region). It is interesting to note that many of the ideas discussed last season (relating to modification of current growing systems), apply directly to managing many of the problems currently being experienced.

Thirdly, focus on offering constructive ideas to growers who are currently considering development of new plantings, so they may hopefully avoid future problems in their respective vineyards. This also applies to those growers who are faced with the decision of whether to remove older, non productive vineyards. The sharing of agronomic experiences can greatly assist farmers who must make tough financial decisions.

In repeating a portion of last years introduction, it should be emphasized, that having invested nearly two decades working directly with Latin American growers and ranchers, my approach has always been directed towards suggesting improvements in areas which require minimum capital investment (reasonable and ready credit is still a major obstacle in most countries).

In essence, the general focus has been in offering practical field suggestions to smaller growers that will assist them in initiating basic modifications of current field activities; with the goal of increasing their yearly cash flow. The ultimate purpose is to encourage continued reinvestment in the farming enterprise as their financial status improves. This format has functioned very effectively over the years for both small and large producers; in national as well as export markets for fresh products.

MAPA 2 GRAPE IMPROVEMENT PROJECT:

The current visit (2006) to the various grape producing areas of southern Bolivia has provided me with a more rounded perspective as to the basic needs and future challenges that lie ahead in developing an economically profitable grape producing industry in the country.

It is my honest opinion that although Bolivia may never rival Argentina or Chile in production capacity, after reviewing the agricultural areas and experiencing the energy and enthusiasm of the growers and technicians, personally I feel with continued efforts Bolivia can develop a unique market for its table grapes.

Therefore, in the following written dialogue, we will discuss elements that in my opinion need to be addressed in order to maintain continued progress. Unlike last year's report which did not cover pre-plant considerations for establishing new vineyards, we will examine basic concepts related to this activity.

PLANNING AND PRE-PLANT PREPARATION FOR VINEYARDS:

One of the principal elements addressed this season in our field seminars was to encourage growers to visualize the differences in agronomic requirements when dealing with grapes versus annual crops such as tomatoes, potatoes, onions, etc. With proper pre-plant preparation, grape vines are going to be in place, and hopefully producing quality fruit for a period of at least fifteen to twenty years.

As a result of this extended time frame, soil profiles and textures, weed pressures, past cropping histories, marketing demands (grape varieties) etc. all should be considered and thoroughly investigated before making the final decision to plant a vineyard.

As my grandfather always said, "If you're a grower producing a crop to sell in the open market, there are three words you should keep foremost in your thoughts when making agronomic decisions." They are, "Bottom Line Profitability." It does not matter whether you have one hectare, one hundred hectares or one thousand hectares. If you want to be financially successful, this adage holds true.

Apart from the romance of the open field, the majority of fruit crops, unlike food staples such as wheat, beans, potatoes, etc., are generally grown by small farmers as cash crops. Thus, the message we wanted to transmit to growers was one that stressed the need to focus more on planning and quality in the establishment of the vineyard and less on the size. Every vine must count in a small vineyard.

ASSESSMENT OF THE FIELD FOR PLANTING A VINEYARD:

We presented the same message in all growing districts; the importance of thoroughly investigating soil profiles in your field prior to planting a vineyard. Grapes have moderately deep rooting systems and require good drainage. To highlight the soils issue, we dug field holes (1 meter deep) during our discussions and invited the participants to make visual inspections. It was truly amazing the number of growers that had no idea of the nature of their stratified soil profiles deeper than 50 or 60 cm. (Considering past cropping histories in most agricultural areas (mainly shallow rooted annuals), it is not surprising that growers were unaware of the restrictions in their field soil profiles).

The visual impact provided from these sample holes in the ground was worth a thousand words. When inspecting weakened vineyards (many no more than four to six years of age), upon digging around the plants, one could clearly see how roots and irrigation drainage were greatly impeded as a result of the differing soil types and stratification.

Normally, my first reaction would be to recommend removing older vineyards if this soil condition was widespread, however due to the current financial limitations in most areas, we suggested that trials be initiated which included digging holes approximately one meter deep and 40cm to the side of affected vines. Afterwards, mixing the varied soil types with organic matter and returning the mixture to the hole. The idea being, that with careful irrigation management, new plant roots could benefit from the improved drainage offered by the nearby hole (a mini sub-soiling system).

Obviously, the simplest solution for mixing these varying soil layers is to sub-soil fields prior to planting. Unfortunately in most rural areas, this is not possible due to high cost, limited equipment availability and restricted access into the narrow rows and small fields.

The same amplified planting hole application holds true for the grower who is developing a new vineyard. Currently, a major obstacle in the successful establishment of vine root systems (in addition to soil) is the small size of the standard planting hole (typically 40cm x 40cm). In most instances, with this shallow planting hole, a grower would probably have more success placing his vines in well drained 20 liter plastic buckets.

Digging all planting holes to this 1 meter depth, although requiring a good deal of extra effort on the part of the grower, provides an alternative means, other than sub-soiling, of mixing the varying soil layers and should facilitate drainage and root elongation in the newly planted vineyard. Added benefits can be achieved by allowing the removed soil to dry on the surface for several weeks, receiving some degree of sterilization through solarization. After which, it is recommended that well cured compost be mixed with the soil prior to returning it to the future planting hole.

Although as stated, it's extra effort on the grower's part, it should be emphasized that the procedure is required only in the initial planting stage, perhaps one time in fifteen or twenty years. Additionally, as a result of these extra efforts in pre-plant preparation, there is a greater potential for good economic returns on the vineyard, conceivably affording the grower the opportunity of hiring someone else to dig the holes in future plantings.

FALLOWING OR CLEAN SEEDING YOUR PROSPECTIVE VINEYARD:

It is imperative from my point of view, that planting sites for grapes, be free for a period of at least one year (preferably two years), from the cultivation of plants in the family of solanaceae (nightshade family). Unfortunately, this includes most of the basic food staples of a large part of the rural community. However, in my opinion the area being considered for the establishment of a new vineyard, should be seeded with cereal grains only during the year preceding vineyard establishment (Recommendations were for a rotation of barley and corn). If the grower requires additional area for solanaceous crops, it's preferable he initiate smaller plantings of grapes. With this option, a grower can use a time frame of 3 or 4 years, gradually increasing the size of the vineyard each season until sufficient cash flow develops from the grape harvest, to purchase staples from other sources. Additionally, I would recommend that in no circumstances a grower intercrop his vineyard with anything other than cereal grains, and never solanaceous cultivars.

It should be noted that the potential for transference of soil borne diseases and nematodes via contaminated seed potatoes is extremely high. Additionally, cultivating tomatoes and peppers on the ground prior to establishing your vineyard, basically assures a high population of nematodes will be ready and willing to attack the roots of your newly planted grape vines. Obviously, soil fumigation would be a quick and timely means of forgoing the above recommendations, but for practical as well as economic reasons, it's currently not an option in most grape producing areas of Bolivia.

WEED INFESTATION:

This is a serious issue which really needs to be addressed. Most fields observed in all growing areas were heavily infested with Bermuda grass; both in established vineyards as well as potential planting sites. These infestations are more easily controlled in the years prior to vineyard development.

After discussing the problem with local growers and examining current field activities in the majority of areas, the following observations were made.

A large percentage of these infestations come from three sources; the use of raw manures (containing live seed) for fertilization, using irrigation water directly from the river or neighbors fields (again live seed transport) and discing, thus spreading the stolons. Whatever the mode of introduction, Bermuda grass in a vineyard is a pirate of nutrients and added competition for both new and established vines.

NOTE: We suggested during the field presentations, that all fresh manures be composted for at least 2 months prior to field application. Not only is it a good sanitation procedure, it can greatly reduce the percentage of live grass seed introduced into the vineyard.

Additionally, a basic program was presented to help lower the incidence of Bermuda infestation in cultivated fields. This includes regular use of herbicides, combined with a sticker (liquid dish detergent is cheap and readily available) and a monthly schedule of herbicide application on newly germinated Bermuda patches. Given the various modes of continuing introduction of fresh Bermuda seed, weed control must be a regular activity in vineyard maintenance. Basic safety procedures when dealing with herbicides were also discussed. It was recommended that a grower designate and clearly mark a back pack sprayer to be used exclusively for herbicide application. Additionally, great care should be exercised in avoiding spray drift on to grape vine trunks. It was suggested a grower use two people in herbicide applications, one individual spraying product while the other holds a baffle against the vine trunk to avoid herbicide contact.

Once the Bermuda infestation pressure is reduced in the field, it was suggested a sponge on a stick be used to spot treat individual Bermuda grass patches (The herbicide mixture is carried in a bucket). This latter application format can save the grower money on product and lowers the risk of direct chemical contact with vine trunks.

INTERPLANTING OF FRUIT AND SHADE TREES:

Another issue that was addressed in our field seminar was the current practice of inter-planting both fruit and shade trees in vineyards. Personally, I highly discourage this activity. Not only do trees lower the

amount of light reaching vine fruiting spurs and canes, they greatly restrict the amount of natural air flow (which can increase both leaf and bunch disease pressures). However, most importantly, trees compete directly for the same nutrients and moisture as your vines. If you must have trees, it is recommended they be planted around the perimeter of your fields...not in the vineyard.

PREPARING TO PLANT YOUR VINEYARD (PLANTING STOCK):

Procurement of high quality planting stock is an issue that should be investigated at least a year prior to establishing your new vineyard. It is recommended that the grower research the grape varieties that are in commercial demand and select one or two that perform well in his area. Additionally, due to the extreme potential of introducing numerous maladies into newly prepared fields via contaminated planting stock, the following options were suggested:

The first and most obvious suggestion is avoid bargain plant; they are never cheap! Personally I recommend, after deciding on the particular variety you want to establish in your future vineyard, begin searching your general area for another grower who has healthy stock in his vineyard. Speak directly to the grower and see if you can negotiate a deal to assist in the pruning of his vines in the fall in return for securing selected canes for producing your own plant stock. (Note: Additionally, it is strongly recommended to use poly sacks when collecting cuttings so as not to allow soil from the donor vineyard to make direct contact with your canes).

From cane collection, follow basic storage procedures until early spring. When temperatures begin to rise, prepare your ground, furrow (approximately 40 cm to one side of your prepared planting holes), pre-irrigate slowly so as to sub the water up and saturate the planting future planting area, wait about 5 days or until you have good friable soil texture and plant your canes (two to a hole 20 cm apart), pack them in, putting two buds below ground and one approximately 3 to 5cm above ground. If insects or rodents are a problem, use oil impregnated 40# paper to form an open cup around the cane approximately 10 cm. high. If necessary, apply an approved insecticide or fungicide if required for additional protection. Keep your planted canes moist...but not wet.

A condition noticed amongst several growers trying to start vines from cane cuttings, was that in my experience, they were leaving too many buds and cane exposed above the soil line. The result can be a low percentage of viable plants, which I attribute in part to buds and canes desiccating from excess sun and air exposure. Another simple procedure that can assist in avoiding confusion when field placing canes (relating to which end goes up), is when preparing your planting canes, cut the bottom at 90 degrees and the upward portion at 45 degrees. Canes should be kept moist at all times in the field until placement in the ground.

CERTIFIED NURSERY:

If a vine nursery does not have adequate sanitation and certification procedures, a grower risks the potential of not only permanently contaminating his ground, but having a mixture of grape varieties that may not be commercially viable. Fundacion Valles through the MAPA 2 Project is currently in the process of developing the necessary protocol for the establishment of a top quality, certified nursery. All grape varieties will be guaranteed true and the plants certified free of known diseases.

After lengthy discussions with the technical staff in Tarija, it was obvious they are extremely knowledgeable and dedicated to the success of the grape nursery program. The ability of growers to purchase this certified planting stock, will offer a tremendous advantage for those producers who are serious about establishing quality vineyards.

FERTILIZATION PRACTICES:

Due to the lack of ready access to local soil and water testing laboratories in the majority of the grape producing areas of Southern Bolivia, it is highly recommended that portable testing kits be purchased and provided to the technical staff in each sector. Currently, a good kit can be purchased for under \$1,000 (U.S.) and will function with little more space than a small table and sink. Additionally, there are hand held meters for testing nitrates and soil pH.

If a region is to continue agronomic progress, it is of extreme importance that growers understand the parameters of the soils, water and vines. These testing kits will assist the technical staff in building this bridge of data for making accurate recommendations in fertilization rates and timing.

Zinc Applications: Based strictly on visual observations in the various growing areas, zinc deficiency seems to be a common condition. A recommendation was made for the yearly application of Zinc Sulfate. The mixture suggested was ½ Kg. of zinc sulfate mixed with 4 liters of water. A simple brush or rag on a stick can be used to dab the mixture on 4 or 5 spurs of each vine. Timing of the application should be within minutes of vine pruning. It's very effective in correcting the deficiency and is a seasonal activity that usually assures an adequate supply of zinc for the coming season's crop.

IRRIGATION FURROWS AND TIMING:

Current irrigation practices were discussed and several suggestions were offered to modify systems. One aspect that concerns me greatly is the current practice of planting vines below grade and running irrigation water in the actual plant row, thus the water is making direct contact with each vine trunk before proceeding to the next plant. I find this not only a potential transmission point for disease from plant to plant, but I feel it encourages weed growth in the area where it is hardest to control and tends to water log soil beneath the plant. I prefer placing the vine on a raised bed (30cm) and running your irrigation water at least 40 cm distance from the vine trunk. Slow the irrigation flow down enough to sub water under the raised bed. This allows you to irrigate less frequently and encourages better root development. Grape vines do not like wet feet.

Note: The long term goal in your irrigation system is to gradually move your furrow into the middle of your rows as the vine matures, thus keeping the beds directly below your leaf canopy as dry as possible. I suggest concentrating your fertilizer applications in this middle furrow year after year. If you plant a winter cover crop (we suggested Barley), it is easier to mow or graze in the late fall and apply fertilizer for your spring bud break (Keeping a shallow furrow for the nitrogen application which should be preceded by an irrigation in order to push the fertilizer into the root zone).

Nitrogen Applications: I feel it would be a productive project to initiate nitrogen fertilization trials in various grape growing zones of southern Bolivia, utilizing light applications of nitrogen (Urea) in the late summer after harvest. It has been my observation in areas which cool down rapidly in the early fall and warm up slowly in the early spring, a late summer (light) nitrogen application after harvest, may offer a nitrogen reserve for pushing early spring growth the following season (leaf tissue testing is very helpful in gauging rates and timing in nitrogen applications).

Micronutrients: As were the suggestions last season, I prefer reducing the recommended label doses to one-quarter the amount and applying it on a regular basis with your fungicides. One-quarter the dose, but applied every 12 to 14 days vs. once every couple of months. My experience and reasoning for this type of schedule is that it maximizes the uptake of the product by keeping a low dose of micronutrients on new leaves. An additional product I feel helps develop better quality fruit, is the foliar application of Calcium Nitrate at a low concentration (after fruit set at a rate of 1/2 kg in 100 liters of water). Depending on foliar N levels, I would suggest 2 or 3 applications.

Phosphorus and Potassium: The need for the development of a generalized soil and plant tissue analysis profile can not be over emphasized. Both P and K fertilizers are expensive and should only be used in the amounts necessary to achieve balanced nutrition in your vine. There are numerous commercial publications which outline the average and optimum ppm/ppt in tissue and soil to maintain optimum production in vineyards. What is needed (as previously mentioned), are some hard soil and tissue testing numbers. As the future unfolds, this knowledge will take you to the next level in the development of the Bolivian grape industry. The portable testing kits will afford an economical and realistic means of collecting this data.

TRELLISING SYSTEMS AND VINE CULTURAL ACTIVITIES:

As outlined in last years report, the majority of growers are utilizing a Guyot or slightly modified form of vine training and support. When faced with heavy rains and wet years, as is the case this season in Tarija, the current system is too closed to achieve good fungicide penetration and leaf coverage. The compaction of the vine and its canes results in a greenhouse effect on the inside, creating the perfect environment for disease.

What was suggested last season is the establishment of trellis trials, basically modifying the current Guyot form and trellis system with the addition of a cross arm and two outside support wires, one running at each end of the cross arm. Ultimately what you end up with is a modified California T- system that allows vine canes to grow upward and cascade outward, forming an arch shape. The fruit bunches are then selected early in the season for size and position (preferably approximately 90 to 120 cm from the ground). The general concept is to allow maximum air circulation within the internal parts of the vine (lowering disease pressure) providing maximum sun exposure for your leaf area and at the same time offering shade for the fruit below.

An additional benefit of this modified T-system is your fungicide applications have a greater potential of covering a higher percentage of the vine. Additionally, if you choose to remove leaves only around developing fruit bunches; you can reduce potential for Botrytis infection by increasing air circulation and fungicide penetration (Without increasing fruit sunburn).

VINE AND ROW SPACING:

Due to the limited size of most farmers land holdings, high density vine planting is more the rule than the exception. An area that needs to be more thoroughly investigated is what is the ideal row and interplant spacing that will allow small growers to achieve maximum fruit production and at the same time, allow for reasonable disease management and field cultural operations.

Somewhere in the area of 3 meters between rows and 1.5 meters to 2 meters between plants would be a good compromise for the Muscatel of Alexander variety (In the areas we observed). Soil type and grape variety also play a part in the final decision.

TOPPING OF VINE CANES:

Another element which is self defeating for the grower is the regular pruning or tipping of the vine canes once they have reached the top of the trellis. It has been my observation over the years, as well as the results of countless university trials, this cane pruning activity greatly weakens the potential of the vine in the proceeding season. It is not an acceptable form of increasing berry size and actually may decrease the vigor of the vine over time; ultimately leading to a lesser quality product. What is recommended is the establishment of field trials utilizing the modified California-T for cane support and instead of tipping canes, it is suggested that all secondary fruit bunches be removed from the vine early in the growing season; thus leaving only quality bunches. Additionally, you might try removing the bottoms of bunches and file one side. This should allow berry sizing without excessive compaction (better air and fungicide penetration with less Botrytis pressure). Possibly, depending on cost and returns, only a portion of each cooperating vineyard could be dedicated to this procedure for the production of your premium export pack.

With continued trials and encouragement, I feel a large majority of growers will come to realize over time, that the California T-system can assist them in the management of required vine growth by pushing growing canes upward so as not to block narrow vineyard rows. Instead of clipping the tips, these canes will then be able to produce the necessary nutrients for storage in the vine's root system, being utilized in the coming season's crop. Wider row spacing in addition to trellis modification, would provide additional space for the canes to grow following fruit harvest.

Ultimately, the modified trellis trials observed in Tarija looked very good. We still had some problems with the old habit of cane tip pruning, but all good things will come with time. I highly encourage the continued push for additional trials in trellising and vine/fruit management.

SEASONAL PRUNING AND VINEYARD SANITATION:

Fall pruning and removal of "mummified" grape stems and desiccated fruit is a very important activity that can reduce disease pressures for the following season. What I would suggest is either the complete removal of all clippings and vine trash from the vineyard or the lining out of this debris in between your planted rows; allowing it to dry and burning it. Obviously, you need to use common sense if the debris is excessive, but most of the plantings I observed, were not producing enough canes and leaves to cause damage to

nearby vines. An additional advantage to this burning activity is although small in amount, you get some potassium being returned to the soil for future plant use.

HAIL MANAGEMENT:

A side benefit of the modified T-system is that it also can offer physical support for the installation of poly fabric in protecting against a serious threat in most growing areas; that is the potential for extreme hail damage to vine and fruit crop. Presently, this polyethylene mesh product is being produced in Mexico and is specifically design to protect crops from hail. This is the first product I have seen that does not significantly interfere with sunlight transmission and most importantly, is very reasonably priced. It can be installed over vine rows on a temporary basis by a team of two individuals and removed and stored for the coming season when harvest is completed. It has a field rated life of approximately eight years.

Again, given the regular damage inflicted by hail each season, I would sincerely recommend some trial plots be established and the product evaluated.

BAMBOO VS. RIVER CANE:

This is only a suggestion and food for thought; however in our travels and presentations around the various growing regions, it was noticed that a large percentage of the vineyards were utilizing common river cane as trellis support. The condition observed with cane was that it rots rather quickly and has very little strength; especially when fruiting begins.

What I would like to suggest, is a search be made for selections of timber bamboo. There are certain lines of bamboo that grow quickly and are fairly cold hardy. Many will grow in the same areas as river cane. However, unlike the cane, bamboo, when properly cured and treated with used motor oil (below ground portion) is very sturdy and can make excellent trellis material. Additionally, it is easy to notch for constructing T-support systems and bamboo poles can last 8 to 10 years.

MOTORIZED BACKPACK SPRAYERS:

In closing, let me just briefly address the subject of the newly purchased motorized back pack sprayers. Personally, if maintained properly, I feel the addition of this new type of sprayer verses the older hand pumped, high volume back pack systems that have been used in the past, has the potential of making the single biggest improvement in vine health and fruit quality of any single item addressed thus far.

From past experiences, the suggestions I would offer in maintaining these motorized sprayers so they function effectively for growers over many seasons are as follows:

1. Use only fresh **filtered** fuel.
2. Use top quality **2-stroke** oil in the mixture.
3. Never leave **old fuel** in the tank for more than **two days**.
4. Always **pre-mix** and **screen-filter** your chemical product **before** adding it to the sprayer tank.

5. **Never** leave mixed chemical product in the sprayer tank over night. Always rinse the tank with a water and liquid soap solution after use and run the cleaning mixture through the system for a few minutes.

SUMMARY:

It has always been my feeling that good field technicians and good farmers are on the same team. The commonality of agriculture and its challenges is what attracts us to one another and achieving profitability in the crop is what ultimately binds us together.