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KOSOVO NEW OPPORTUNITIES FOR AGRICULTURE PROGRAM

BERRY SECTOR TECHNICAL ASSISTANCE



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DISCLAIMER

This report was prepared by the New Opportunities for Agriculture project team of Tetra Tech ARD based on a Final Report prepared by Short Term Technical Advisor, Mr. Richard A. Dale. The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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BACKGROUND

USAID supports economic growth in Kosovo through programs that strengthen and improve competitiveness of Kosovo agribusinesses, improve the business environment, and encourage local economic development. Accordingly, USAID/Kosovo has awarded ARD the task order for the New Opportunities in Agriculture in Kosovo Program. The goal of the Program is to increase economic growth in Kosovo through expanded, environmentally sustainable production and sales of value-added agricultural products by enabling producers and processors to compete regionally and globally.

Kosovo currently is growing strawberries, blackberries, raspberries and small amount of currants. There is no known production of cranberries, gooseberries or cultivated blueberries grown in Kosovo at present. The Program is looking to expand and increase berry production in Kosovo and needs to assess and rank which berry crops are best to invest in, and which are least appealing in terms of competitiveness (i.e. cost of production, export and production feasibility and yields). The Program needs to look at the introduction of new berry crops for future new planting opportunities in blueberries, cranberries and gooseberries to expand and increase current production.

PURPOSE OF ASSIGNMENT

The purpose of this technical assistance is to evaluate and assess the production and competitiveness of the berry fruit sector in Kosovo for fresh export, import substitution, and value added frozen and dried food processing. The following are the berries that need to be evaluated:

- Blackberries and raspberries
- Strawberries
- Currants and gooseberries
- Cranberries and blueberries

The assignment will provide the Program with a road map for next steps in the development of the berries sub-sector in Kosovo over the next three years. The objectives are to:

1. Assess berry production and processing in Kosovo in terms of its scale and potential for growth;
2. Rank the berry crops in terms of their ability to compete in export markets, and generate sales and jobs. Determine which berry crops the Program should invest in to get the most impact in terms of increased competitiveness, sales and jobs;
3. Determine the feasibility of an appropriately scaled and designed refrigerated pre-cooling and cold storage for fresh berry production and provide recommendations for its establishment.

EXECUTIVE SUMMARY

The commercial berry industry of Kosovo continues to produce the same products in the same manner as was done in many parts of the former Yugoslavia prior to the end of communism and the breakup of the Socialist Federal Republic of Yugoslavia (SFRY). Essentially strawberries, raspberries, and blackberries are grown and hand-harvested for bulk process export markets—originally as pre-cooled in tankers or block frozen, and more recently as tray or tunnel frozen for Individually Quick Frozen (IQF) for process markets. A part of this production is collected wild berries such as bilberries (commonly called “blueberries”) and wild strawberries. The other part of this production is hand harvested cultivated berry crops of cultivars that were introduced during the early 1960’s.

During the last two decades--essentially the turbulent period of wars and realignment that has disrupted development in much of the region--the global berry industry has been changing dramatically due to technological advances. Many berry crops--raspberries, blackberries, and blueberries in particular-- are now being harvested by machines. Hand harvest of berry crops for processing will remain marginally competitive for a short while longer in the Balkans only due the low wage expectations of domestic farm labor. As living standards improve and wages rise, farm labor is expected to become scarce and expensive. It might be there will be a handful of larger producers in Kosovo who will be able to transform their farm operations to machine harvest, but those who cannot adapt the new technologies due to terrain, economies of scale, or lack of capital will be left behind.

The high quality fresh berries found in most modern markets around the world represent hand-picked fruit. Berries will be handpicked for fresh markets for the foreseeable future.



Prices paid to producers for quality fresh market berries are several times the prices currently paid for process quality berries, and will support higher wages to attract and sustain harvest labor.

The natural resources of appropriate soils, water, and climate that favor small fruits production, exists in Kosovo. The best appropriate cultivars of modern small fruits have already been proven in trials and small plantings here. North American highbush blueberries do well under similar conditions in nearby Serbia. Centrally located, Kosovo is well situated to access European markets. The mild more southerly climate of Kosovo would be expected to enable Kosovo to bring its fresh berry harvest to markets ahead of larger European producers such as Poland and the Netherlands. Continuing lower wage scales would also give Kosovo a competitive edge in this labor intensive industry during the first years of fresh market berry production development.

In light of these findings, NOA should initiate a five point strategy to assist Kosovo in developing a fresh market berry industry for domestic and European markets.

1. Develop in Kosovo a “knowledge base” for fresh market berry production and marketing across the value chain.
2. Initiate North American highbush blueberry production as a new crop for Kosovo.
3. Working with farmers and cold storage processors, transition existing production of strawberries, raspberries, and blackberries to high-value fresh markets.
4. Create necessary access to specialized inputs, technologies, and infrastructure.
5. Support market development and linkages.

As perennial berry crops require time to establish, all of these activities will need to be undertaken simultaneously if significant results are to be realized in the remaining three years of NOA’s mission.

FIELD ACTIVITIES TO ACHIEVE PURPOSES

Upon arrival, the STTA consultant was briefed by NOA staff members regarding the present conditions in Kosovo, the current state of the agricultural sector here, and the nature of berry sector in particular. Multiple reports pertaining to production, markets, environmental conditions, climate, and potentials provided by the NOA staff were read by the consultant to increase an understanding of conditions in the field. More than 20 interviews, farm visits, and industry tours were conducted to inform the findings and recommendations of this assignment. A listing of the business and stakeholders visited is included in Annex II of this report

Three PowerPoint presentations were prepared:

- A Five Point Strategy to Develop Kosovo’s Berry Industry,
- An Introduction to North American Highbush Blueberry Production, and
- An Introduction to the Production of Raspberries and Blackberries for Fresh Markets.

The PowerPoint presentations may be seen on the New Opportunities for Agriculture Program’s website at www.noakos.com

Two workshop presentations were made to stakeholders to present and discuss the strategies that have been developed to improve the berry production sector for Kosovo.

The first workshop was conducted in Pristina on August 4, 2011 with approximately 25 stakeholders participating.

The second was at Shterpce on August 8, 2011 with 13 stakeholders attending.

TASK FINDINGS AND RECOMMENDATIONS

Task 1: Assessment of the berry production in Kosovo in terms of its scale, potential, and priorities for development

SCALE

Kosovo, geographically about the size of the State of Delaware, is a small country with a population of slightly more than 1.8 million people. The Kosovo population is the poorest in Europe with a per capita income of \$2,800. 23.6% of the population is employed in agriculture. Although berries is listed 3rd as one of Kosovo's principal agricultural products among wheat, corn, potatoes, and peppers; agriculture, as it contributes to the domestic economy, accounts for only 12.9% of GDP. Most farms are small, near subsistence, and inefficient. Small plots, lack of mechanization, and lack of technical information impedes growth of the agricultural sector.

The Kosovo berry industry is small relative to neighboring Serbia and other major European producers. 35 hectares are estimated to be in cultivated berry crops producing an estimated 400 metric tons, most of which is dried, juiced, or frozen as processed bulk products to be exported. An additional 1100 metric tons of berry products are collected wild berries, mostly bilberries (commonly referred to as "blueberries") and wild strawberries. Most common cultivated berries include strawberries, raspberries, and blackberries. North American highbush blueberries are not as yet grown commercially in the country. All of the berry crops are harvested by hand, or in the case of wild bilberries, hand raking. Small amounts are sold fresh in local green markets and grocery stores, often poorly packaged and unrefrigerated.

Serbia was once a major channel for berry products produced in Kosovo, but the current political standoff and subsequent boycott has made this trade increasingly difficult. Many routes through the former Yugoslavia to Central and Western European markets are also closed to Kosovo transit.

POTENTIAL

The future for a Kosovo commercial berry industry that could compete regionally, pay good wages to farm labor, offer good returns on investment, create additional jobs in a distribution industry, and contribute to the national economy is in the production of berries for high value fresh markets.

Present production is mainly collection of wild "frest" crops such as bilberries and wild strawberries, or in the cultivation of older domesticated varieties of raspberries, blackberries, and strawberries which continue to be hand picked for processing. Cold storage processors who are the receivers of these raw berry products have been reporting for several years that the numbers of people collecting wild fruits continues to decline. Farmers likewise are recognizing that it is getting increasingly difficult to hire harvesters for their cultivated berry crops. This trend will continue as living standards rise and workers demand higher wages.

At the same time, in major berry production regions of the world the harvest is being mechanized. Already in Canada and the USA nearly 100% of raspberries and blackberries harvested for process utilization are picked with a machine. The same trend

is occurring in Europe. Already, Libertas, the largest producer of berries in Serbia employs four self-propelled Korvan berry harvesters in its raspberry operations near Šabac. Machine harvested berries already determine price offerings for processed berries. Hand picked berries from the Balkan regions or from the former Soviet Republics in Eastern Europe will only continue to compete marginally until harvest labor will no longer be sustained by the prices paid.

Berries for the fresh market are picked by hand everywhere they are produced in the world. More than leveling the playing field for a potential Kosovo fresh berry industry, this fact tips the immediate situation to the advantage of Kosovo producers. Even as wages will rise, it can be expected that farm wages paid in Kosovo will be below Western standards for some time. Labor expense accounts for more than 50% of the cost of production in the fresh berry industry. This immediate condition will create large competitive margins for Kosovo.

SWOT Analysis				
Fresh Market Commercial Berry Production for Kosovo				
	Strength	Weakness	Opportunity	Threat
Production	Good soils, water, climate, reasonably good transportation infrastructure, producer interest, and strong farming traditions exist	Lack knowledge regarding fresh market berry production. Lack special inputs, herbicides, & plant materials	Higher prices paid for fresh berries will support increased wages for farm labor and other transition costs	Site selection is critical: Climate, soils, drainage, and/or available water may prove unsuitable for optimum results
Quality	The best fresh market cultivars of raspberries, blackberries, strawberries, and currants have been proven to be well suited to the region	Older cultivars of berries presently grown are not suitable for fresh markets. No experience with Highbush blueberry culture.	Support training for fresh market berry culture, new plantings of modern cultivars, & establishment of farm-to-market cold chain	Set attitudes and behaviors from producing for process markets. Lack of fresh market harvest & post-harvest experience
Competitive Position Regional Markets	Kosovo & adjacent markets are wide open for development as currently there is little offered.	Kosovo is not presently a producer of cultivated highbush blueberries	Expatriates living in Kosovo supporting various missions are an immediate potential market	Present Unemployment and low incomes may restrict domestic retail purchases
Competitive Position in Global Markets	Close proximity to Central and Western European markets. Harvest labor costs will be lower than most competition.	It will take time for Kosovo to emerge as a producer of cultivated HB blueberries	Seasonal entry into the market will likely be two weeks ahead of major producer Poland.	Obstruction by Serbia and lack of full EU recognition could restrict access to some markets

Despite present political difficulties with some of its immediate neighbors, Kosovo is well situated for the long term close to strong markets in Central, Southern, and Western Europe. Also, because of her mild climate and southerly location relative to competing berry production in Poland, Russia, and the Netherlands, it can be expected that Kosovo berry crops will be early into European fresh markets ahead of most of the competition.

Temperate climate berry crops grow in Kosovo. Even the best new cultivars for fresh markets are proven. The climate, soils, sunlight, and water are right. It is not a question as to whether or not the crop is suitable or can be produced—the questions are how will it be marketed—and is Kosovo able to do what needs to be done to address that market.

PRIORITIES FOR DEVELOPMENT

To achieve the largest results for the Berry Production Sector of NOA's mission, within the time remaining, a strategy to:

a.) transition existing production to higher value markets, while

b.) supporting proven entrepreneurial potential for major new initiatives,

should guide the priorities of the project. Effort and resources can not be committed to stakeholders who lack experience, production potential, proven commitment, and vision. As process berry fruit is low value, and hand-harvested-fruit-for-process is rapidly becoming non-competitive and obsolete,

c.) the focus of berry production for Kosovo going forward should be on high value fresh markets.

A “Shot Gun” approach, where all priorities are addressed simultaneously will need to be implemented, since time constraints of the project will not allow for a more linear development plan.

1. Build a “Knowledge Base” for Fresh Berry Production and Marketing

As has been stated, present berry production in Kosovo reflects the hand-harvest for process berry production established throughout the former Yugoslavia during the post-WWII period. As has been also stated, hand picked berries for process markets will be unable to compete in the future as living standards and wages rise. High value markets will be required to sustain production. It should not be assumed that because a family has produced strawberries, raspberries, or blackberries for a generation or more that they will be able to successfully produce for fresh markets. In some ways their traditions and habits may actually work against them. They need to understand clearly that standards that can pass for process fruit may not be acceptable for demanding fresh markets.

Fresh market quality for small fruits is first based upon selecting the proper cultivars for production—varieties that are large, attractive, flavorful, and that have enhanced shipping qualities and shelf life. As important as varietal selection, are the conditions under which the fruit is grown. Weeds, disease, and insect pests must be effectively controlled. Supplemental irrigation is a given. Tunnel production might provide added protections or more profitable harvest “windows”. Finally, the manner in which the berries are harvested and handled in the post-harvest is critical for quality. Harvest must be timely, dry, and gentle. Packed in an industry-appropriate package, berries must be immediately pre-cooled to check respiration, and kept humidified to avoid moisture loss. Finally, fresh market berries must be stored, shipped, and displayed at optimum temperatures to prolong

shelf-life. Once the “cold-chain” has been established, it must not be broken until purchased by the ultimate consumer.

These essential requirements must be taught, in detail, to everyone in the value chain: producers, harvesters, shippers, distributors, and retailers. A regular series of training programs will need to be provided to include presentations, field trips, and farm visits. Old habits will have to be broken, new methods and technologies adopted and careful attention must be given to detail. The rewards will be worth it to all involved. Prices paid to farmers can be expected to be 4 to 10 times more than what is presently received for processing fruit.

2. Initiate Commercial Blueberry Production for Fresh Market

The establishment of commercial North American highbush blueberry production for fresh markets should be a high priority for NOA. Kosovo will have several competitive advantages to be able to participate in this rapidly evolving new fruit industry for Europe. Three years will not be enough time to see a significant amount of Kosovo blueberry crop entering regional markets, but it is enough time to prepare the foundations of an exciting new fruit industry, and produce a “show piece” result that will inspire future investments.

A successful entrepreneurial investor with both the expressed vision and the means to successfully implement should be selected and supported in this initiative. Five hectares of production, with the capacity and desire to expand to ten or more hectares, would represent a minimum qualifying proposal.

One such candidate would be Bujqesi at Peja, Mr. Florim Shala, owner and manager. Mr. Shala owns several businesses; including privatized agricultural land on which he has established a successful dairy and beef farm (100 milking cows). He has expressed an interest to diversify his farm business with up to 20ha of fruit plantings. His plan is to “specialize” in apples and/or blueberries. An excellent site was inspected. Soils and drainage look promising. The pH was tested with a result of 5.5. Irrigation is available. He indicated he could have the field fitted and ready to plant by fall 2011.

A well designed 5ha plantation with proper row and plant spacing would require 13,890 blueberry plants (2778 plants/ha) valued at \$49,310 plus shipping. This purchase could be cost-shared with the stakeholder. Cultivar selections can be informed by comparison with known successful Serbian plantings in similar climates. NOA could provide close technical support either through STTA consultant involvement, involvement of a trained staff specialist, or by linking the stakeholder to a private sector blueberry nursery and consulting service such as Fall Creek, of Oregon.

A feasibility study follows in this report for a fresh berry packing and cold storage facility – for estimated costs see Annex VII. It is recommended that such a facility should be sited at, or very near, this commercial blueberry plantation development. Access to immediate pre-cooling, packing, and cold storage will be required by the producer to insure the highest quality product for fresh markets. It may be that an existing building could be made available for this purpose by the stakeholder. Equipment and refrigeration could be cost-shared.

The Blueberry Enterprise Budget included in Annex III of this report will be helpful in developing a business plan with the stakeholder. As demonstrated by the budget, a conservative estimate is that, as the plantation approaches maturity, it would yield in excess of 91,680# (41,673kg) of blueberries annually for a gross value of \$187,526 (132,117€).

3. Transition Existing Production of Strawberries, Raspberries, and Blackberries for Fresh Market by Supporting Cooperating Farmers and Cold Storage Processors

A strategy to transition from process to fresh markets would be to support existing cold storage processors to work with farmers presently supplying product to their collection sites. NOA could cost share appropriate pack-line equipment and pre-cooler and/or refrigeration upgrades to accommodate fresh market handling of berries. NOA could also provide market research and linkages for cold store operators to be able to enter new markets. Cold Storage processors wanting to plant their own plantations of berries to supplement the volumes they are purchasing from others for fresh markets could be eligible for cost-shared plant materials. Processors might also act as “farm service centers” to their community of farmers by supplying them with special inputs, packaging, and rental equipment such as sprayers, mowers, and rotary tillage.

As a first step, growers would need to replace older plantings of strawberries and brambles with newer fresh market appropriate cultivars. NOA would secure quantities of plants that can be made available to qualifying farmers. Costs could be shared. Each farmer would be allowed to receive sufficient plants to replace up to 1 hectare of present production. Farmers already producing appropriate cultivars would be eligible for plants sufficient to plant up to 1 hectare of additional production. Sites would have to be inspected and approved by NOA for suitability. Farmers within 5 kilometers of a participating cold storage processor/distributor; or who will develop on-farm pre-cooling, packing, and refrigerated storage; would be given priority for plant material allotments.

Rather than creating a parallel industry from scratch, such a plan would take advantage of existing expertise, investment, and production, as well as reduce redundancies and foster cooperation.

4. Create Access to Specialized Inputs, Equipment, and Facilities

Constraints to either establishing new berry production for fresh markets, or transitioning existing berry production to fresh markets, will be access to necessary specialized inputs, equipment, and facilities.

Appropriate Planting Materials: Farmers do not currently have readily available sources for fresh market appropriate cultivar planting materials. NOA could facilitate importation and cost-sharing of plant materials for farmers in the short term, and support the modernization and expansion of one or more existing domestic fruit plant nurseries to become the supplier/s for the long term.

Chemicals: Appropriate pesticides, especially herbicides for weed control, are reported as not readily available to farmers. The recently approved Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP) should be amended to include EPA approved herbicides for use on berry crops. Once amended, NOA should make this IPM recommended program, with approved EPA and Kosovo MAFRD approved controls, available to farmers and enlist the cooperation of Kosovo farm chemical suppliers to stock these supplies.

Soil Conditioners and Special Fertilizers: Products such as Soil conditioners, e.g. elemental sulfur to lower pH for blueberries, and special fertilizers such as ammonium sulfate (again primarily for blueberries) or foliar applied fertilizers or nutrients such as chelated iron need to be available to farmers as needed. Farm input suppliers need to be introduced to these products and encouraged to make them available.

Packaging: Industry standard clamshell packaging with mated masters will need to be made available as appropriate packaging for fresh market distribution. Inventories of these supplies could be made available through the cooperating cold storage processor/packers who will receive the berries and for pre-cooling, packing, cold storage and distribution to fresh markets. Such an arrangement would assure that the community of farmers supplying the processor/packer would all be using the same package for uniformity of product.

Special Equipment: The cold storage processor/packers might also function as “farm service centers” to their community of farmers by owning and maintaining an inventory of rental special equipment. Walk behind rotary tillers, air blast sprayers, mowers, or other identified special implements could be purchased on a cost share basis with NOA and made available to farmers on a rental basis. Pack-line equipment, pre-cooling units, and appropriate cold storage could be cost shared with larger producers for on-farm installation, or existing cold storage processors could be supported to remodel their facilities to enable them to handle fresh market berries received from multiple producers. In this case, retail ready fresh market berries would diversify the present product line.

5. Support Market Development

NOA will work with the value chain to identify, support, and link fresh markets for Kosovo producers. Domestic terminal wholesale markets and retail outlets will be informed as product becomes available. Educational materials and/or training presentations will be provided to stress the need and importance of cold-chain maintenance. Assistance will be provided for promotion and proper merchandizing of Kosovo fresh berry products.

As projected supply increases, NOA will work to identify international export markets and link Kosovo producers to potential foreign wholesale buyers. NOA will also work with producers and shippers to resolve logistical issues related to shipping.

Task 2: Berry crops ranked in terms of importance to compete in export markets, to generate sales, and to generate jobs.

Berries for the fresh market will continue to be harvested by hand world-wide. The higher prices paid for high quality fresh market berries provide margins of profit that enable higher wages to be paid to harvest labor. This is likely to be the case for the foreseeable future. As it is unlikely anytime soon that Kosovo will have sufficient production of berries on adaptable sites that could warrant capital investment in mechanization of harvest, it is recommended that existing, expanding, and new berry production for Kosovo focus on high-value fresh markets that can support well paid domestic hand-harvest labor. Recent fresh market berry prices in Serbia are given in Annex IV of this report

1. Blueberries

Among berries that might offer opportunity for a Kosovo fresh-market berry industry, cultivated Highbush Blueberries would top the list. Of all the berry crops, cultivated blueberries exhibit the highest tolerance to handling and shipping, and offer excellent

shelf-life. A North American native, cultivated highbush blueberry is still a new crop for Europe. Nearly 85% of world production is centered in the USA and Canada. Since 1970, Poland has emerged as the major producer of cultivated highbush blueberries for Europe with 2,000ha now in production, but Poland still only accounts for 10% of the world crop. There is considerable opportunity for additional production in Europe, especially for the fresh market. Recent credible studies revealing the spectacular health benefits of blueberry consumption have been widely reported creating a sustained surge in consumer demand. Current fresh markets are strong and prices paid are high.

Kosovo could expect to compete well in West European markets. Prices offered to Kosovo growers could be expected to be on a par with other European producers. However, as cost for labor can represent 50% or more of production costs for fresh market berries, current Kosovo labor costs would be a fraction of labor costs borne by competitors from other regions. Although Poland is the major producer in Europe, its northern geographic location, relative to other Central European countries, will dictate the calendar for its harvest. It could be expected that similar cultivars of blueberries grown in Kosovo's more southern location and climate would precede the Polish crop in the market by two weeks or more. The earliest crops bring the highest prices to those who can produce them.

The down side to highbush blueberry production is that the plant is very slow growing, and requires a considerable pre-productive period to establish. The first small harvest generally can be expected during the third year following planting, and a full harvest will not be realized for 8-9 years. Well cared for plantings, however, have continued to produce for more than 35 years providing a long return on investment.

There is no present production of blueberries in Kosovo. Producers willing to establish production will need considerable technical support in the first years of establishment and production.

2. Raspberries

Red Raspberries would rank second on the list of fruits to be considered for fresh market production in Kosovo. Measure for measure no fresh berry brings a higher price on current markets than high quality fresh raspberries. Although production for the fresh market is demanding, fresh market raspberries will be highly rewarding for those who can succeed in producing them.

The basic horticultural knowledge for growing raspberries is present in Kosovo; however the commonly grown Willamette and Meeker cultivars are not appropriate for fresh market and will need to be replaced. Fresh market raspberry production requires modern cultivars that offer spectacular size, color, flavor, and firmness for increased shelf-life. The best summer bearing (floracane bearing) raspberry for the fresh market is currently **Tulameen**, the best fall bearing (primocane bearing) raspberry is **Polka**. Both are proven in Kosovo, and are rapidly being accepted by Kosovar growers. The crop must be grown to exacting standards, blemish free. Well managed supplemental drip irrigation and control of weeds, insects, and disease is essential. Production in tunnels might be considered to extend early and late harvests as well as to improve berry quality.

The larger challenge may be the implementation of the appropriate harvest and post-harvest handling strategies and techniques that are essential to the quality and improved shelf-life of the product. Attitudes and behaviors that will need to change will be encountered in the presently available work force. Operations need to be timely and

gentle. There can be no lags or breaks in a cold-chain that must be established from farm to consumer.

3. Strawberries and Blackberries

Strawberries and Blackberries are also presently grown in Kosovo, often by the same farmers producing the raspberries. While blackberries in the fresh market are less in demand than some of the other berries, they are gaining in popularity. Strawberries, on the other hand continue to be the most popular fresh berry fruit in the world. Kosovo growers are already working with improved cultivars that would be suitable for the fresh market. **Elsanta** is the most commonly grown strawberry. **Chester** is the most commonly grown blackberry. Both are appropriate for fresh markets. Much of this fruit is produced, hand-harvested, and marketed bulk in way similar to raspberries for processing, and is often purchased by the same domestic receivers.

There are some larger growers already producing for the fresh market. **Agroviszioni** at Lypjan produces 5ha of strawberries for Pristina markets. Some of the production is grown under row covers to extend the harvest season. Extensive investment is being made in new cold and controlled atmosphere (CA) storage facilities. 75% of the strawberry production at **Agroviszioni** is **Elsanta**. **Bio-Buzmi**, at nearby Ferizaj also markets a considerable volume of fresh strawberries to Pristina. These businesses, and others like them, should be supported in their efforts to expand their production and improve the quality of their products. They will serve as a model to be emulated by others.

4. Red Currants and Gooseberries

Red currants and gooseberries are both in the *Ribes* plant family and as such require similar sites and environments for production. Both will grow on heavier soils that may present problems for most other fruits. Both are minor crops with regard to market demand.

However, red currants (which range in color from white to deep purple), can be eaten as a fresh fruit and are gaining popularity, especially with restaurants for use in fresh salads or as a garnish on meat dishes. They may present an alternative opportunity for producers whose sites are less favorable for other fruit culture or as a high-value diversification for growers of more traditional crops.



5. Black Currants

Black Currants are exclusively produced as a process fruit for juices, concentrates, jams, sauces, and jellies. Specialty wines and brandies are also produced from black currants. It is a popular “fruit flavor” in Europe—usually included in the “rainbow” of fruit flavored products from soda and juice to frozen pops and candies. In the USA it is little known as yet due to early 20th century prohibitions against its production. The plant was an alternative host to a devastating disease afflicting five-needled pines. Disease resistant or immune varieties of black currants are now widely available.

The crop has been traditionally hand-harvested throughout Europe—especially East Europe where it is widely grown, however, like raspberries and blueberries it is adaptable to machine picking and harvests in Europe are being mechanized. There could be some opportunity for Kosovo as it has been demonstrated that it will grow well here in selected areas. Like Gooseberries and Red Currants it will grow well in heavier soils less suitable for other berry fruit crops. It could be a diversification crop for larger blueberry growers if machine picking would ever be implemented, as the same harvest and post-harvest technologies can be applied to both crops.

6. Cranberries

Cranberries are not recommended for this project. In the first place they are exclusively a fruit for processing. Secondly, “bog production” is the most usual method for cranberry production in North America, where 95% of the world’s crop is grown. Very specific sites are required with acidic soils, sand base and a high water table. Diked “bogs” are flooded at various stages of production for harvest, stem removal, and winter protection. Establishment usually involves a lot of heavy earth moving, engineering, and permitting for water use and discharge. Finally, the culture for the crop is unique from the experience of other fruit culture. Comprehensive training and ongoing technical assistance from North American cranberry experts would be required.

Task 3: Feasibility for an appropriately scaled and designed refrigerated pre-cooling and cold storage for fresh berry production and recommendations for its establishment.

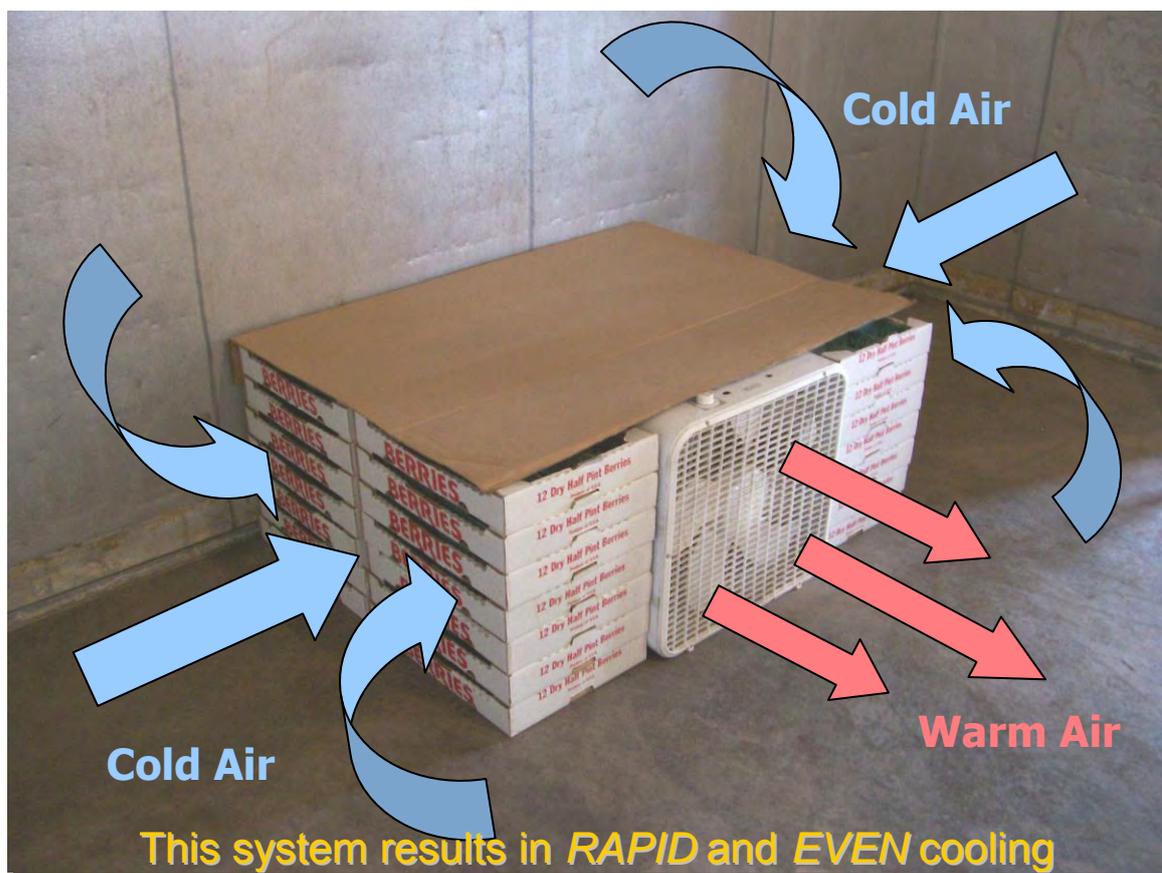
Only the highest quality fruit is appropriate for the fresh market. A large part of “quality” relates to production on the farm, but just as important to “quality” are harvest and post-harvest handling practices and systems to which the fruit will be subjected. Berries, often categorized as “small fruits”, and perhaps more appropriately as “soft fruits”, are the most fragile products of the fresh produce industry. They have demanding harvest and post harvest handling requirements and relatively short shelf-life under the best of conditions. Although there are some basic principals that apply to the harvest and handling of berry fruits in general, each fruit presents unique requirements and, in some instances, opportunities. The differing characteristics of the berry fruit that will be handled needs to be considered when planning a cooling, packing, and cold storage facility to serve the fresh market.

Raspberries present the greatest challenge as this fruit has very thin skin, soft watery pulp, and very high respiration rates. The best modern varieties for fresh market, properly produced, free of blemish, picked in a gentle & timely manner, properly pre-cooled, refrigerated, transported, and displayed at optimum temperatures and humidity, will have a shelf-life of 7-10 days. Older processing cultivars, such as Willamette and Meeker, poorly picked and handled, without pre-cooling or cold-chain to consumer, have shelf life of only 1 day.



Raspberries for fresh market should be hand-harvested directly into the tills that are the sale packaging. In this system, the berries will be touched once—and only once—which is when they are picked. Pickers are trained to “sort” in the field, placing only “perfect” fruit in the tills. Fields should be harvested every second or third day to prevent over-ripe fruit from being presented to the harvesters. The berry receptacle, with its stem, should be left on the cane. If the berry is not “releasing” readily, it should be considered under-ripe and left for the next picking. Every effort should be made to be as gentle as possible. Once picked, the harvested fruit should be kept out of the sun under shade. Clean damp muslin draped over the flats will keep the fruit hydrated and cool until it can be pre-cooled. Raspberries need to be pre-cooled within two hours following picking. Every 5°C reduction of temperature can reduce respiration by as much as 50%. For every hour of delay in pre-cooling, shelf life of fresh raspberries may be reduced up to one day.

As sorting and grading is accomplished in the field, shed requirements for fresh **raspberries, blackberries, red currants and strawberries** might only need to address cooling, refrigerated storage, and hygiene. A pre-cooler for these fruits would be a cold room of sufficient capacity to receive the daily harvest. A rapid-recovery refrigeration system must keep the room at a temperature of 9°C. Harvested fruit is stacked in its appropriately vented flats or lugs in opposing “walls” and “roofed” with panels or battened tarp. A high volume fan is placed in the open end of the tunnel to draw cold air through the stacked berries. Use of convection air cooling in this manner rapidly removes field heat from the fruit and greatly retards the respiration process—ideally in less than one hour.



Berries stacked in a “still-air” cooler will actually experience a rise in temperature during the first hour of cooling due to continuing respiration, and may take as long as six hours to approach the desired 9°C pre-cooled pulp temperature.



Blueberries require the same attention given to cooling and cold-chain, however the thicker skin and denser pulp of the fruit allows it to be bounced and rolled a bit which enables it to be harvested mechanically or by hand shake to bulk lugs and then air-cleaned, sorted and packed with semi-automated shed equipment.



Most fruit for fresh market is still hand-picked—most often to a pail on a neck strap of the harvester. Smaller bushes can be more efficiently harvested using a hand-shake to a catch-tub method.

Machine harvest of blueberries removes the fruit from the bush at a rate up to 100 times the rate of a single hand harvester. This is accomplished by “shaking” the bush and catching what falls. While the newer machines are amazingly clean and efficient, there is still material--leaves, green fruit, damaged fruit, the occasional insect, even a stone or machine part now and then--that needs to be sorted from the berries before they can be packed for market.



This sorting is accomplished by machinery expressly designed for the purpose. Both mechanical harvesters and shed equipment are available in a variety of sizes and capacities. In the USA, farms as small as two hectares of blueberry production may find mechanical harvesting and on-farm packing and cold storage affordable and cost effective.

Some of the same equipment, with minor adjustments, will also process **black currants, gooseberries, and lingonberries**. At this time in Kosovo with the low cost of labor, hand-harvest would be recommended, however appropriately scaled on-farm cooling, cleaning, packing, and cold storage may be desirable.

Several well established companies manufacture equipment for the berry packing/processing industry. Lakewood Manufacturing of Holland, MI assisted with design and quoted prices for the equipment making up the fresh pack line described in this report. Blueberry Equipment Incorporated (BEI) of South Haven, MI made the original recommendations for a plant layout. Additional design considerations were added from the experience of HIGHLAND VALLEY FARM at Bayfield, WI which has been using a blueberry fresh pack line, similar to the one proposed, since 1996.

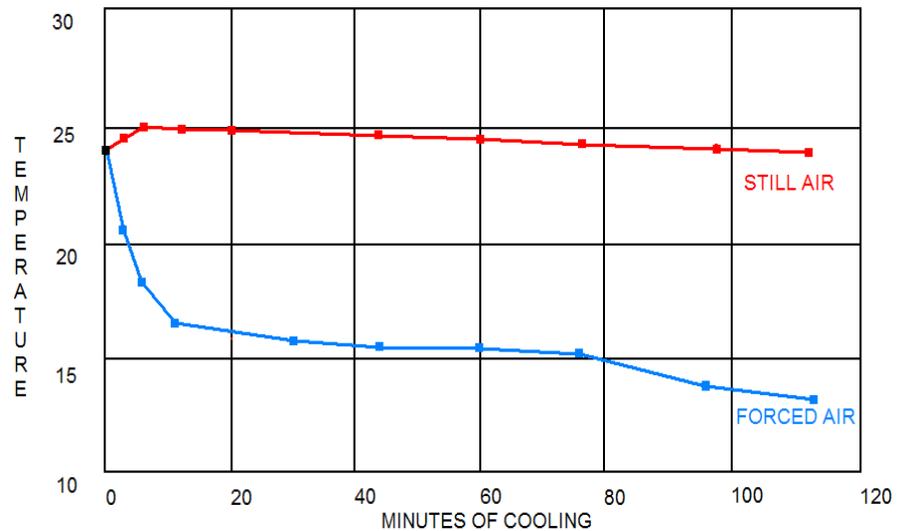
Blueberries packed for the fresh market ideally are cleaned and sorted using a “dry” line system. The dry line system, while being somewhat more labor intensive, is simple to operate and less costly to capitalize than alternative systems.

Most importantly a dry line system will produce the highest quality fresh product. An alternative “wet” line system would yield primarily a process quality product.

The basic dry line system for blueberries begins with convection-air pre-cooling where field heat is quickly removed from the berries as they are received from the field.

As with brambles and other soft fruits, a 9°C cold room with rapid recovery refrigeration is recommended. Timely pre-cooling can add as much as 7-10 days of shelf-life to the fresh blueberry product.

COOLING RATES FOR BLUEBERRIES IN FORCED AND STILL AIR COLD ROOM @ 9C



After pre-cooling, the fruit is put on a chain-link inclined conveyor and passes through an “airblast cleaner”. An engineered stream of air passes through the fruit on the conveyor lifting out anything lighter in weight than a ripe berry. Leaf litter, loose stems, insects, dust, even small green fruits are effectively removed.

From the air cleaner the fruit moves across a “tilt-belt sorter” where 80% or more of the soft or damaged fruit is removed, as well as connected berry clusters and any trash that passed the air cleaner.



Firm undamaged fruit, that can roll easily, crosses the “tilt-belt” and onto the “inspection conveyor belt”. Workers visually inspect the fruit as the berries pass beneath special lighting and remove any remaining defects—at this point mostly under-ripe berries. The last inspector on the line has control over the process and can shut the line down momentarily for the sort crew to catch up as needed.

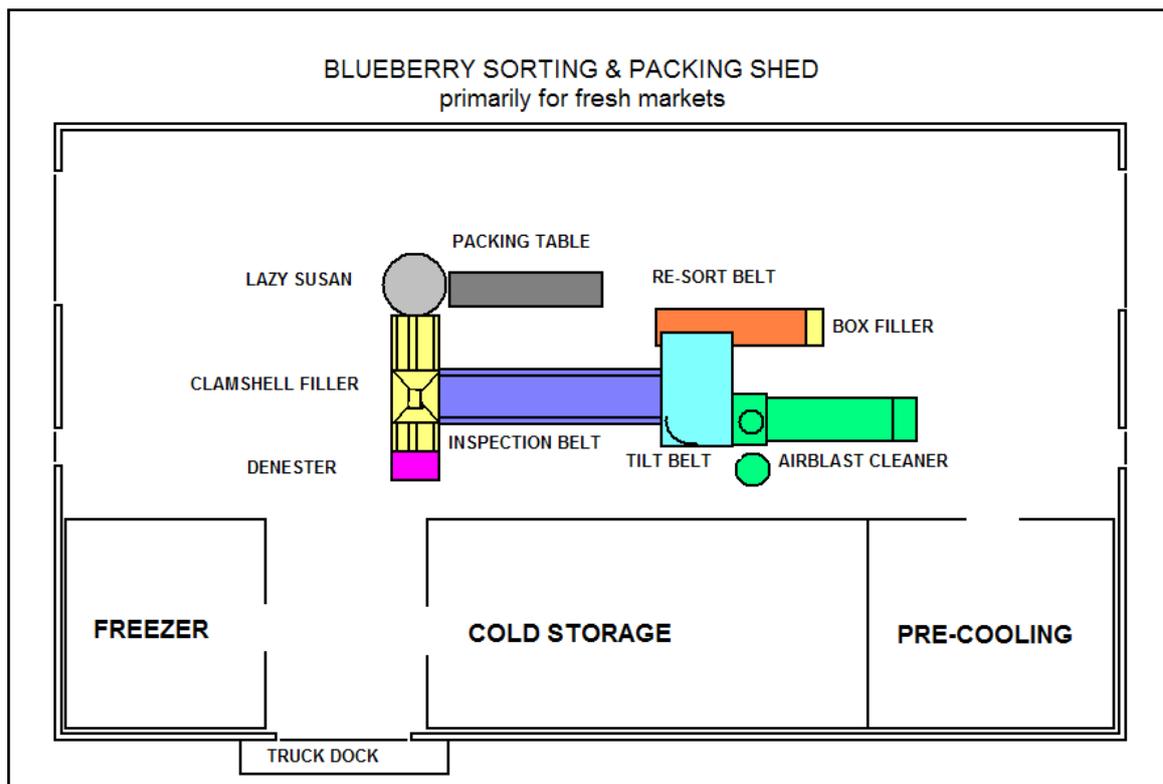


The berries move from the inspection conveyor to the “clamshell filler”. A “denester” can be added to automatically place clamshell tills on the line to be filled. The machine fills clamshells to a set volume. The filler can be adjusted to fill clamshell packages as small as 125gm to clamshell containers as large as 2-3kg. After passing the filler, the clamshells can be automatically closed. Labeling can be automated on the line following closure, or packaging can be pre-labeled prior to the harvest season.

The filled clamshells move onto a “lazy-susan” from which they are picked up and assembled into flats or cases and labeled. Finished flats of berries are then palletized and moved to the cold storage area where they are held pending shipment. The cold storage room should be maintained at 0-1°C and 95% humidity to retard respiration and prevent moisture loss.



Additions or options can be made to the line, as deemed necessary, to meet more demanding specific customer product requirements. A computerized “color sorter” will grade to a specific degree of ripeness, a “destemmer” will remove retentive stems (a problem of some cultivars only and most usually in the later part of the harvest season), a “sizer” will grade and sort berries according to consistent size, a “box filler” can be substituted as an alternative to the clamshell filler, and a “metal detector” can provide assurance that no metal is passing on the line. Also, the labeling process can be automated following the clamshell filler or box filler.



Requirements for the building are that it be cool: at the very least insulated from late summer heat, and preferably air conditioned if heat build-up is a problem. It must exclude vermin and insects and should have cleanable wall and floor surfaces. There must be sufficient floor space for the convenient temporary placement and movement of pallets of packaging supplies and full and empty field lugs. The walls and floor surfaces need to be able to sustain high humidity and regular hosing with water. The production floor needs to feature a central grated gutter-style drain to receive the wash from daily equipment and floor cleaning. Adequate facility for employee lockers, rest rooms, and hand washing must be provided. Lunch room and management office space are options. Mechanical considerations need to include adequate power, specific lighting systems, pure water for cleaning, and optional heat for the office, mechanical service, and employee areas.

Cold storage capacity is determined by the storage needs of the harvest on a weekly basis as a minimum. In the case of this 5 hectare production model:

8,333 kg annual yield per hectare X 5	= 46,665 kg total harvest
46,665 kg / 5 weeks of harvest	= 8,333 kg per week
8,333 kg / .34 kg per till X 12	= 2,042 flats per week

2,042 flats stacked in approximately 10 rows X 10 deep X 20 high allowing for a 1m wide aisle for access and cold air circulation would require approximately 20 m² of cold storage floor space. The pre-cooling cold room processes the harvest on an every-other-day basis and would need to be approximately 1/3 the capacity of the storage unit.

Estimated costs for the packing facility and major equipment are included as part of the *Blueberry Enterprise Budget* in Annex VII this report. A thumbnail review and explanation of the projected capital costs related to the packing facility include:

44' X 36' (147.3 m ²) insulated building on slab @ 35.00/sq'	\$55,440.00
287 sq.' (26.7 m ²) of refrigeration @ 50.00/sq'	14,350.00
basic fresh-pack line	
air blast cleaner #14125	16,900.00
tilt belt sorter #16000	12,500.00
inspection belt #10120	15,275.00
clamshell filler #31000	16,650.00
lazy susan collection table #17100	<u>2,450.00</u>
	<u>63,775.00</u>
TOTAL PROJECTED COST	\$133,565.00

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE ACTIVITY

The findings supporting the development of a fresh market berry production industry for Kosovo are sound. As perennial fruits require time to establish and mature before returning production and consequent cash-flow, no time can be wasted in the remaining three years of the USAID-NOA mission in implementing a program for development. In addition, a strategy that will address all five priorities for development simultaneously will be required:

- Develop in Kosovo a “knowledge base” for fresh market berry production and marketing across the value chain.
- Initiate North American highbush blueberry production as a new crop for Kosovo.
- Transition existing production of strawberries, raspberries, and blackberries to high-value fresh markets.
- Create access to specialized inputs, technologies, and infrastructure.
- Support market development and linkages.

To support this plan the following actions are recommended:

1. Support an individual stakeholder in the establishment of a five hectare commercial North American highbush blueberry plantation.

This stakeholder should be an example of entrepreneurship and past business success, a person, or a company, that has the expressed vision, the capacity, and the willingness to make the investments and implement the actions that can result in a successful project. Several good candidates have been identified, including but not limited to the following list.

- **Bujqesi**, Mr. Florim Shala at Junik
- **MOEA**, Mr. Vullnet Malazogu at Gjilan
- **ASK Foods**, Mr. Erton Namoni at Gjilan
- **Scardus**, Mr. Dobrivoje Stevanovic at Shterpece
- **Fungo FF**, Mr. Fatmir Krasniqi at Kamenice

These candidates should be interviewed again and a selection should be made based on suitability, capacity, and commitment to the project. The selection process should be completed within the present month and a MOU signed between the stakeholder and NOA.

Plants sufficient to plant a 5 ha site should be ordered immediately. 13,890 plants will be required at an approximate cost of \$50,000 USD. A blend of early, middle, and late season highbush cultivars is recommended: 20% Duke, 40% Bluecrop, 20% Nelson, and 20% Elliott.

The stakeholder will be required to begin preparing the site immediately. The field should first be mowed and allowed to green. When the green growth of grass and weeds is 10-15cm tall, the field should be treated (boom sprayed) with Round up (Glyphosate) to kill all perennial weeds. After browning down (a period of two weeks following treatment), the field should be rough plowed with a heavy disc or chisel tooth plow.

Repeated cultivation with spring tooth and harrow should follow every two to three weeks to germinate out the bank of annual and perennial weed seed. Retest the soil to assure proper pH and correct if necessary. P and K can also be spread at this time if the test indicates the need. By the end of October, the field will be ready to plant.

Irrigation needs to be planned and IN PLACE before plants arrive.

We have been advised by American nurseries that it would be advisable to ship plants in the late winter for spring planting rather than fully leafed plants in the fall for fall planting. Preferred cultivars may also be more available for spring planting than at this late ordering date for fall planting.

As this is a new crop to Kosovo, intensive technical assistance will be required on an on-going basis. This could be provided by a well-trained NOA specialist, regular consultations with an STTA consultant, OR by linking the stakeholder to a private sector American blueberry nursery and consulting service such as Fall Creek in Oregon. The latter model has been observed in the Republic of Georgia where Fall Creek is having success working with blueberry investors on 5-10ha developments.

Under the best of circumstances there will be no appreciable Kosovo crop entering the markets during the remaining mission of USAID-NOA, however a –show piece” development could result that would become a foundation for an exciting new industry for Kosovo inspiring future investments.

2. Place an Order for \$100,000.00 worth of Perennial Berry Plants for 2011 Fall Planting.

Access to improved releases of berry planting materials has been identified as a major constraint to Kosovo’s ability to produce for fresh berry markets. Strawberry growers are in need of replacement –mother plants” for existing plantations and additional stocks are needed for expansion. Raspberry growers need new cultivars to replace outdated plantings of Meeker and Willamette processing berries. Access to blueberry plants is presently non-existent in Kosovo.

Half of the amount recommended will be required to support the proposed 5ha commercial blueberry plantation project. The other \$50,000 of recommended purchased materials should be divided between strawberry plants, raspberry plants, and additional blueberry plants: 50% strawberry, 40% raspberry, 10% additional blueberry. Allotments of plants should be made to qualified stakeholders on a cost sharing basis. Applications for sufficient plants to add or replace up to 1ha of berry planting per qualifying stakeholder should be accepted on a first-come first-served basis. Smaller allotments of up to 100 blueberry plants could be cost shared with those applying to grow a blueberry trial for demonstration in their municipality. All applicants for plants need to have properly prepared, weed free, cultivated sites with irrigation present and operable before October 1, 2011.

Ordering plants now, based on estimated need and determining the allotments after the orders have been confirmed will provide greater assurance that preferred cultivars will be available from the nurseries.

3. Identify and Support a Berry Fruit Plant Nursery for Expansion and Modernization.

In the short term, NOA can assist growers in need of planting materials by importing and cost sharing plants from foreign nursery operations. If a fresh market berry production industry is to be sustainable for the long term, farmers will need access to plants that are produced domestically. Examples of small nurseries were identified during the consultancy. What is needed by the selected nursery to meet future needs in Kosovo is Technical Assistance and plants to establish clean blocks or nursery fields for propagation materials.

After an interested nursery is selected, the stakeholder should be supported with an allotment of plants, a consultation with a STTA berry plant nursery expert, and an opportunity to travel to a berry plant nursery operation in Poland or the Netherlands. This activity should be implemented within the next present year.

4. Identify and Support at Least Three Cold Storage/Processors Willing to Enter Fresh Berry Markets.

Producers willing to transform or expand their production to address fresh market opportunities will need close access to convection air pre-cooling, appropriate short term cold storage, and cold-chain distribution services. It will be in the interests of the cold storage processors currently serving process fruit markets to begin to diversify their product lines to include the distribution of fresh market berries. The transition will likely require improvements and equipment investments that could be cost shared by NOA.

Supported cold storage processors also would be expected to become “farm service centers” to the community of farmers needing special inputs to implement fresh market berries in their municipalities, e.g. special fertilizers or chemicals, appropriate “clamshell” packaging, irrigation supplies, special tools or implements.

Cold storage operators with expressed interest and capacity in municipalities that would benefit from the availability of such services would include:

- **Agroviszioni**, Mr. Labinot Spahiu at Lypjan, fresh-market strawberry producer
- **ASK Foods**, Mr. Erton Namoni at Gjilan, fruit producer and processor
- **Fungo FF**, Mr. Fatmir Krasniqi at Kamenic, processor with restaurant markets
- **Agroproduct (APC)**, Mr. Avin Shabani at Podujeva, processor and raspberry producer
- **Scardus**, Mr. Dobrivoje Stevanovic at Shterpce, processor and raspberry producer with interest in blueberries

Selection of qualifying stakeholders and MOU should be negotiated within the current year.

5. Seek to have Changes Made to PURSUAP to Include Herbicides Appropriate for Berry Plantings and Identification of Pests and Approved Controls for Blueberries.

The largest constraint to efficient production observed in Kosovo fruit plantings was uncontrolled weeds. Berry fruits are shallow rooted plants and do not compete well with weed infestations for water and nutrient. Cultivation close to the plants can sever and injure roots. Strawberry growers have largely adopted plastic mulches as a partial

solution for weeds, but in doing so limit themselves to ribbon row production rather than matted row production—a system demanding more plants than are often available for planting. Heavy organic mulches can be helpful, as can careful management of seeded non-creeping permanently sodded thoroughfares. In the end, however, appropriate herbicides need to be part of an effective IPM weed management program.

- glyphosate (round-up)
- glufosinate (Rely)
- simazine (Princep)
- oryzalan (Surflan)
- dichlobenil (Casoron)
- terbacil (Sinbar)
- flumioxazin (Chateau)
- carfentrazone (Aim)
- mesotrione (Callisto)

Multiple choices would be advisable as individual compounds are more effective on some weeds more than others, and herbicides should be rotated to avoid building resistance in weeds.

A second problem that PERSUAP needs to rectify is that the NOA recommended MAFRD approved IPM program does not include any listing of BLUEBERRY pests or their controls--bilberries are Vaccinium, but not blueberries. Problems a North American grower might have to address would include:

- **arthropods:** bud mites, aphids, nematodes, fruit worms, blueberry maggot, leaf roller, leaf hopper, & Japanese beetle;
- **fungi:** phomopsis, godronia (both stem cankers), anthracnos, mummyberry, alternaria fruit rot, & botritis fruit rot;
- **virus:** red ring spot, shock, mosaic, shoe string, stunt, & leaf mottle
- **bacteria:** crown gall

It is presently unknown how many of these problems would be encountered in Kosovo--or there could be an indigenous problem not present in North America--time will tell. It would be advisable to have appropriate controls approved and listed so that when pest and disease problems do arise, the industry can respond quickly.

6. Begin at Once to Plan and Implement Training Programs that can Develop a “Knowledge Base” to Support a Fresh Market Berry Production Industry.

The essential requirements for fresh market berry production must be taught, in detail, to everyone in the value chain: producers, harvesters, shippers, distributors, and retailers. A regular series of training programs will need to be provided to include trainings, presentations, field trips, demonstrations and farm visits. Informational handout bulletins should be produced for distribution at such events and meetings. Old habits will have to be broken, new methods and technologies adopted and careful attention must be given to detail and coordination.

Serious environmental and health related problems can arise from non-compliant use of farm chemicals. In response to an amended PERSUAP IPM program to include a broader offering of controls for pests and weeds, pesticide application training must be made available to farmers. If advisable, the MAFRD should be urged to make such training and certification mandatory for farmers to purchase pesticides.

Farmers must learn the importance of selecting the best cultivars for fresh market production. Proper site plans and preparations must be made. Timely and well targeted pest management must be applied. Irrigation scheduling must be understood and implemented. New methods and standards for harvest must be learned and applied. All involved must understand the added value of an unbroken “cold-chain” from farmer to consumer.

A field trip to a blueberry production area such as Arilije, Serbia would provide an important learning experience for those interested in blueberry culture. An invitation has been made by Mr. Sasa Marusic, Berry Sector Lead for the USAID-Serbian Agribusiness Project headquartered Belgrade. Determine whether such a visit could be politically possible and respond to this invitation.

An annual day long fruit growers educational conference should be planned for January or February. This could be timed to coordinate with relevant STTA consultancies, but could also utilize NOA staff specialists and local or regional experts. Such an event might feature a small trade show or technology exhibits. NOA specialists and key stakeholders should be enabled and encouraged to attend relevant regional or international conferences.

Training for fresh fruits promotion and merchandizing needs to be planned and implemented for terminal and retail marketers, as well as restaurant chefs and owners. Point of sale materials should be developed and distributed to support marketers.

Press releases for all of these events should go out to the television, radio, and print media to increase public awareness.

7. Develop a Marketing Plan to identify both Domestic and Foreign Market Opportunities.

An available immediate market for fresh berries may be the expatriate population currently serving in Kosovo. A study should be undertaken to determine the demographics of this population. Who are they? How many are they? What are their incomes? Where do they live and work? Where do they shop? What restaurants and hotels do they patronize? Are they currently being served? Could this niche be large enough to support early entry into domestic markets by several Kosovar producers? If the answers to such a study are encouraging, such a strategy would create a presence in the market place. Work with the outlets that interface with expatriates. Resident Kosovars frequenting the same outlets would be presented with the new products and many would eventually try them. The domestic market will grow as production will increase.

Market linkages will be important. Early on determine what nearby and accessible foreign markets exist that could be interested in Kosovo fresh market berries. Determine logistics and constraints. Identify potential buyers and learn what prices might be paid. Carefully prioritize those who understand the importance of the “cold chain” and have the capacity to participate. Share this information as it becomes known with the participating Kosovo cold storage processors—now becoming distributors.

ANNEXES

Annex I Kosovo Map

Annex II List of Stakeholders Visited

Annex III Blueberry Enterprise Budget: One Hectare for Fresh Market

Annex IV Serbian Fresh Berry Markets: Recent Prices Paid

Annex V Blueberry Plant Propagation Bulletin

Annex VI Elemental Sulfur to amend Soil pH

Annex VII Manufacturer Quotations for Fresh Berry Pack-line Equipment

ANNEX I : Kosovo Map



ANNEX II : List of Stakeholders Visited

1. Lypjan: Agroviszioni, Mr. Labinot Spahiu, growing 5ha strawberries and 10 ha apples. Interested in alternative crops. Markets strawberries fresh to Pristina.
2. Ferizaj: Bio-Buzmi, Mr. Gege Zefi, growing strawberries.
3. Ferizaj: Mr. Sabri Berisha, growing 0.5ha blackberries. Markets fresh locally
4. Podujeva: Agroproduct (APC), Mr. Avin Shabani, processor & cold storage. Lacks production. Would like 10ha fall bearing raspberries. 2ha Polka & Autumn Bliss raspberry plantation recently established.
5. Podujeva: Producers for APC, brother partners, Mr. Mensur Cakaj & Raif Cakaj, growing 0.95ha Willamette and Autumn Bliss raspberries.
6. Junik: Bujqesi, Mr. Florim Shala: Will diversify successful 100 cow dairy farm with up to 20ha fruit. Would prefer blueberries. Has excellent site with pH 5.5
7. Gjakova: Mr. Humaj, growing 0.25ha Chester blackberries
8. Deqan: Privatized Land, Mr. Ali Ismajlaj, developing dairy farm. Interested in cranberries and apples. Heavy clay soils, pH 4.9-5.1, humus 1.1%. Probably not good fruit ground.
9. Deqan: Dredheza, Mr. Xhavit Mulaj, fruit plant nursery. Interest in blueberries. Successfully propagating strawberries and currants.
10. Shterpce: Scardus, Mr. Dobrivoje Stevanovic, processor cold storage, freezing wild fruits and cultivated raspberry production of eleven growers representing 2ha. Expressed interest in blueberries.
11. Shterpce: Grower for Scardus, Mr. Novica Pavletovic, growing .05 ha. Polka, Willamette, and Meeker. Would like to transition all to new varieties
12. Debellde, Viti: Berry propagation and production site. Mr. Hamdi Hasani, Trials of red and black currants, three year old potted blueberries for propagation. Raspberry and blackberry production. No market.
13. Mramor: Eurofruti, Mr. Bejtush Gashi, 2 year old processor and cold storage freezing wild fruits. Would like to encourage local farmers to produce raspberries for him. Plan for 2.5ha raspberry plantation
14. Gjakova: Babaj Bokes, Mr. Halim Rustemi, plant nursery and production.
15. Gjilan: MOEA, Mr. Vullnet Malazogu, Vertically integrated farm/juice operation. Fresh strawberry production for domestic market. 0.25 ha under tunnel for early harvest: Alba and Roxanna (Italian) cultivars. 2ha outdoor field production early and late season varieties
16. Gjilan: ASK Foods, Mr. Erton Namoni, partnership of three brothers. Large vertically integrated farm/processor. 105 fulltime employees. 200ha fruit production. 20ha apples, 3ha raspberries. Modern processing plant. 80 products. Canned condiments (olives, peppers, –salsa”, pickles, regional specialties, etc.), juices, jams. 200-300 farmers supplying raw fruits and vegetables. 300 wholesale domestic customers. Exporting to Croatia.
17. Peja: Skender Pelaj, potential BB grower, 7.5ha site, no water or improvements.
18. Kamenice: Fungo FF, Mr. Fatmir Krasniqi, produces mushrooms, processor and cold storage for wild fruits. Interest in berries for fresh market. Serves 120 restaurant customers. Would like to plant 1ha site as demonstration.

ANNEX III : Blueberry Enterprise Budget

The Blueberry Enterprise Budget presented here is intended as a planning tool only. The one hectare production model represents current values for Kosovo in US dollars. Area and quantities are expressed in metric measures.

BLUEBERRY ENTERPRISE BUDGET FOR KOSOVO

ONE Hectare for FRESH MARKET/RETAIL-READY, hand harvest, values in USD

prepared by Rick Dale, 7/06/11

item	year 1	year 2	year 3	year 4	year 5	year 6-15	memo	15 year total
1. plants (2778)	9,861.00	493.00	0.00	0.00	0.00	0.00	@ 3.55/plant	10,354.00
2. mulch	750.00	375.00	375.00	375.00	375.00	375.00	150 m3 x 3.00	6,000.00
3. sulfur to pH 5.0	0.00	0.00	0.00	0.00	0.00	0.00	1125kg @ .83/kg	0.00
4. herbicide	120.00	120.00	120.00	120.00	120.00	120.00	round-up	1,800.00
5. fungicide (dmnt.)	0.00	0.00	243.00	243.00	243.00	243.00	liquid lime sulfur @ 2.16/liter	3,159.00
6. fungicide (cane)	0.00	32.00	32.00	32.00	32.00	32.00	Captan 50WP @ 5.94/kg	448.00
7. fungicide (fruit)	0.00	0.00	151.00	151.00	151.00	151.00	Benlate 50WP @ 37.40/kg	1,963.00
8. insecticide	0.00	40.31	40.31	40.31	40.31	40.31	Malathion 25 WP @ 3.74/kg	564.34
9. fertilizer	0.00	165.00	165.00	165.00	165.00	165.00	543.4kg/yr banded @ .40/kg	2,310.00
10. containers	0.00	0.00	1,543.96	3,087.93	4,631.89	6,175.85	0.252/pint (clamshell & case)	71,022.31
11. equip. (owned)	534.93	534.93	534.93	534.93	534.93	534.93	prorated, see equip. appendix	8,024.00
12. equip. (other)	0.00	0.00	1,201.92	1,201.92	1,201.92	1,201.92	prorated, see equip. appendix	15,625.00
13. overhead	144.00	144.00	144.00	144.00	144.00	144.00	prorated, see o.h. appendix	2,160.00
14. labor: production	1,302.00	714.00	797.00	712.00	837.00	1,172.00	see man-hour appendix	16,082.00
15. labor: harvest	0.00	0.00	1,575.00	3,150.00	5,250.00	6,930.00	see man-hour appendix	79,275.00
16. labor: manage.	570.00	570.00	570.00	570.00	570.00	570.00	see man-hour appendix	8,550.00
17. total expense	13,281.93	3,188.24	7,493.13	10,527.09	14,296.06	17,855.02		227,336.65
18. gross income	0.00	0.00	9,374.06	18,748.13	28,122.19	37,496.25		431,206.88
19. annual net	-13,281.93	-3,188.24	1,880.93	8,221.03	13,826.13	19,641.23		
19a. net returns	-13,281.93	-16,470.18	-14,589.24	-6,368.21	7,457.92	19,641.23		203,870.23

definitions

20. 3333 meters of blueberry row is equal to one hectare of blueberries.
 21. 0.34 kilograms blueberries is the weight of one pint
 22. 2.50 kilograms per meter of row equals blueberry yield. 3.00 kg per bush
 23. 8332.5 kg per hectare equals blueberry yield.
 24. 4.50 equals wholesale price per kg (packed clamshell pints). 18.36 per case (12 pints) wholesale
 25. **19,641.23** equals annual net return after sixth year for one hectare 1.53 per pint (340 grams) wholesale
 26. 98,206.15 equals annual net return after sixth year for five hectare. 2.30 per pint retail @ 50% mark-up
 27. 196,412.31 equals annual net return after sixth year for ten hectare.

50. total enterprise =	16,669 meters	5.00 hectare	2,850.68	100% management
	41,672.50 kg total harvest		3,465.83	10% harvest
	gross 187,526.25		840.20	80% mulching
	expense 89,296.52		500.12	20% pruning
	net profit 98,229.73		105.03	20% mowing
	profit + owner labor 106,726.76		735.18	100% spraying
			8,497.04	owner labor compensation

owned equipment for five hectare enterprise, 15 year life

28. 25,000.00 tractor: 25-40 HP, low profile, wide front, live PTO, width under 6 ft.
 29. 3,500.00 sprayer: 300 litre capacity minimum, airblast
 30. 2,500.00 mower: 4-6 ft., flail or rotary
 31. 2,800.00 trickle irrigation system (not including well or water source
 32. 120.00 backpack sprayer
 33. 5,000.00 tillage equipment: plow, disc, harrow, cultivator
 34. 1,200.00 fertilizer spreader
 35. 0.00 optional: 2nd tractor with loader, two wheeled wagon/trailer
40,120.00

other equipment for five hectare enterprise, 15 year life

36. 0.00 mulch spreader
 37. 0.00 BEI LBT harvester
 38. 63,775.00 packing line equipment
 39. 14,350.00 walk-in refrigeration
78,125.00

40. Prorated equipment costs (lines 11 & 12) include depreciation, lease, or rent.

overhead annual expenses for five hectare enterprise

41. Prorated expenses (line 13) include fuel, maintenance, utilities, property taxes, insurance, interest on loans, and office expense.
 Does NOT include marketing, transportation, education, publications, or conference expenses.

labor: man-days requirements for one hectare

	year 1	year 2	year 3	year 4	year 5	year 6-15	pay rate per day	15 year total
42. site prep/maint	20	10	10	10	10	10	21.00	160
43. planting	25	2	0	0	0	0	21.00	27
44. fertilize/spraying	7	7	7	7	7	7	21.00	105
45. mowing	0	5	5	5	5	5	21.00	70
46. pruning	0	0	5	10	15	20	25.00	230
47. mulching	10	10	10	10	10	10	21.00	150
48. harvest	0	0	75	150	250	330	21.00	3,775
49. management	20	20	20	20	20	20	28.50	300
50. total man-days	82	54	132	212	317	402		4,817

ANNEX IV : Serbian Berry Markets and Prices

The following information was received on August 5, 2011, from Mr. Sasa Marusic, Berry Fruit Sector Lead, USAID Serbian Agribusiness Project, Belgrade , Serbia:

–Although rain and drought impacted quality and yields a little bit, this season we had good crops and we succeeded in:

- exporting a half of blueberry production: export prices (depending on term) varied between 4 EUR (in cardboard or wooden trays) and 5-8 (125g punnets) EUR/kg; depending on season farmers were paid 3 to 5.5 EUR/kg
- establishing regular exports of smaller quantities of fresh raspberries at average export prices 4-5.5 EUR/kg; farmers' prices varied from 1.2 to 1.6 EUR/kg
- fresh strawberries were usually shipped to Russia at 1.2-2 EUR/kg (wooden crates) and smaller quantities to Austria at 1.8-2.25 EUR/kg (punnets); farmers were paid 0.9 to 1.7 EUR
- blackberries and currants: only trial shipments were done and prices were either not relevant or not available.

Wholesale prices are typically around the same level as lower export prices.”

ANNEX V : Blueberry Propagation Bulletin

Blueberry Propagation

Before propagating blueberries, evaluate land use in relation to time, land investment, equipment, labor, and structures needed. Identifying a source true-to-name and disease-free is essential for successful propagation. Do not propagate from plants adjacent to bushes showing disease symptoms. A vast majority of blueberry propagation is done by relatively few commercial growers because of investment and cost. Most new growers can get into production sooner if they buy rooted cuttings rather than producing their own plants.

Highbush blueberries can be propagated by both hardwood and softwood cuttings. Most propagation is done with hardwood cuttings, as they are easier to handle and are less perishable than softwood cuttings. However, softwood cuttings allow more rapid multiplication of plants. Cuttings are whips or shoots that are cut into several pieces, each 4 to 6 inches long. There are 3 types of cuttings: leaf buds only, 1 to 2 fruit buds in addition to at least 2 good leaf buds, and a cutting taken from the middle of the previous year's growth with one or more fruit buds removed. Research shows a higher percentage of rooting is obtained from leaf bud cuttings than from fruit bud cuttings with fruit buds removed.

Hardwood Cuttings

Selecting whip/cutting wood

Proper selection of shoots is important for rooting. Take dormant, well hardened, unbranched, one-year-old whips/shoots from "mother" plants. Whips should be one-fourth inch or less (pencil width) in diameter but not spindly. Do not use shoots formed late in the season, as they are poorly hardened; such shoots often have an off-white to brown pithy interior. Look for healthy leaf buds on the whip. Avoid wood that might be diseased with *Botrytis* twig blight, bacterial blight, or *Godronia* cane canker.

Cuttings made from wood greater than one-fourth inch in diameter don't root as well, but may still produce desirable plants. Do not use thin wood unless cutting wood is scarce. Prepare whips by removing the fruit buds and cutting the whips into lengths. Cuttings cut less than 4 inches long have a smaller stored food supply, so greater care is needed to get them to root.

Whips may be cut mechanically using a band or bench saw, or by hand using a sharp knife or pruning shears. Cutting by hand allows the basal cut to be nearer a vegetative bud; this is especially important for hard-to-root cultivars (table 1). The cuts must be clean, taking care not to damage or bruise the bark. To stimulate rooting, slice a one-half to one inch long layer of bark from both sides of the base of the cutting. Protect the cuttings from drying out.

Table 1. Rooting characteristics of hardwood cuttings of Pacific Northwest cultivars

Easy	Moderate	Hard
Bluetta	Earliblue	Spartan
Patriot	Collins	Bluejay
Northland	Olympia	Ivanhoe
Blueray	Herbert	Bluecrop
Berkeley	Jersey	Darrow
Coville	Elliott	
Jersey	(1613-A)	

Collect cuttings in early spring before bud break. Timing in Washington, Oregon, and Idaho is February/March for small-scale farms. For large-scale farms, start taking cuttings in late January. A minimum of 850 to 1,000 chilling hours (for northern highbush types) is needed for shoot growth and flowering to occur. It is best to take cuttings in late March and place them immediately in propagation flats. However, often propagators must start early and store the cuttings.

Storage

Stored cuttings should be cleaned, placed in plastic bags with sphagnum moss, and stored at 34 to 40 F. Maintain a humidity of 80 to 90 percent. Temperatures below 30 F may damage the wood. Cuttings can be stored for 2 to 3 months. Ensure good ventilation when using boxes or trays. Fill boxes or trays with sphagnum moss to increase humidity and prevent cuttings from drying out. The shorter the length of storage, the better. Storage of cuttings can be difficult and should be done only if necessary.

Propagation structures

Propagation beds should be located in full sun with a suitable well-drained medium. Place beds either on the ground or raised above the ground. Construct propagation frames from good quality, new, treated wood. The frame bottom should have crosspieces for supporting heavy-gauged wire. Place hardware cloth over the wire. Beds are usually 4 feet wide, 8 inches deep, and of various lengths. A well-constructed propagation bed will help reduce insect, disease, mouse, and gopher problems.

Rooting frames should contain a heating source. Place frames in glass or plastic greenhouses. Recommended bottom heat is between 68 F to 73 F. Often heating coils are used to maintain a more constant media temperature. Heat sources include propagation heating mats, hot water tubing, and lead, rubber, or poly-covered cable. Good quality thermostats maintain a constant heat. See the manufacturer of these products for current recommendations and application methods. Avoid wide temperature fluctuations and drafts in the propagation bed and greenhouse structure to promote rapid and even rooting.

Rooting media

Rooting media include sphagnum moss, American, German, or Canadian peat, sawdust, sand, cinders, perlite, and vermiculite. Peat alone as a medium creates problems when trying to separate the roots before transplanting. Root media need to have a pH of 4.5 to 5.5. Fresh sawdust is not recommended. Several medium mixes work well:

- Mix #1. 50% sphagnum peat moss and 50% coarse-washed concrete sand
- Mix #2. 50% peat and 50% vermiculite or perlite
- Mix #3. 30% perlite, 30% sand, and 30% vermiculite (or perlite)

Mix these media thoroughly before placing on the screens in propagating beds. Bluecrop requires a higher proportion of sand. Water the rooting medium thoroughly. Add extra medium as the new medium settles. Maintain a depth of 8 inches.

Placing cuttings

Before inserting the cuttings into the medium, label them well as to cultivar and mother block. Place the cuttings vertically (right side up with vegetative buds pointing upward) into the medium, leaving 1 or 2 buds above the medium (60 percent covered). If bottom heat is used, insert one-third to one-half of the cutting into the medium. The butts of the cuttings should not touch the bottoms of the frames. Set the cuttings in a 2- by 2-inch, or 2- by 3-inch spacing. For larger root development, a 3- by 3-inch spacing is recommended. Press the medium around the base of the cuttings. Failure to do so will cause the cuttings to dry out. In the Pacific Northwest, cuttings are usually stuck, or inserted, from January 15 to March 10.

Water/light

Water the cuttings thoroughly about once a week to keep the medium moist but not water-logged. Water more frequently when the leaves have developed. Full sun is best for growing quality plants.

Growth

During April and May, vegetative buds will produce leaves. By June, the roots begin to form. Fifty to 98 percent of the cuttings should root. The period of May 1 to June 15 is critical for root and foliage development. After roots and foliage have developed, increase ventilation and apply fertilizer. Often fertilizer is applied weekly in a soluble form (i.e. 15-30-4, 13-36-13) or slow-release form. Nitrogen (N) is needed to maintain active growth. Nitrogen can be supplied as ammonium sulfate (1 oz/gallon water), ammonium phosphate, urea, or in other formulations.

When diseased cuttings or leaves are found, carefully remove and destroy them and increase ventilation, and/or apply appropriate fungicides (type depending on disease present). Rooted cuttings remain in the medium to overwinter in the propagation frames.

Remove rooted cuttings the following spring. Either line-out rooted cuttings in pots, or place them in the ground, spaced 8 by 18 inches or 8 by 10 inches.

Softwood Cuttings

Softwood, or summer, cuttings are used to speed propagation of blueberry plants. Concord, Herbert, Ivanhoe, Stanley, and Bluecrop (which are difficult to propagate by hardwood cuttings) root more easily by softwood cuttings. However, softwood cuttings require a mist system and well ventilated propagating structures. Thus, blueberries are more difficult to propagate by softwood than hardwood cuttings.

Take softwood cuttings in June while the mother block plant is growing actively. Shoots of the first seasonal flush of growth make the best wood for cuttings. Take cuttings before fruit buds start to form.

Cuttings should be 5 to 9 inches long, with 2 or 3 leaves. Place cuttings 2 inches deep into rooting medium made up of equal parts of perlite and peat moss, or another acceptable mix. Mist irrigation and shade are required to prevent foliage from drying out and dying.

After roots and foliage appear, good air circulation will help prevent the spread of diseases. Periodic sprays of fungicides will serve as prophylactic measures to prevent Botrytis, root rot, bacterial canker, and other diseases. Check with Oregon State or Michigan State Extension recommendations to select and schedule use of proper fungicides to reduce likelihood of developing fungicide resistance.

Softwood cuttings should root in 4 to 7 weeks and can then be transplanted into peat or plastic pots. Plants can be forced in a greenhouse during the winter months for additional growth. A complete soluble fertilizer will help ensure good foliage and root growth. Do not allow evening temperatures to fall below 60 F.

Rooting hormones

Rooting hormones may increase the percentage of rooting of cuttings, but have not been proven effective.

Tissue Culture

A few laboratories have begun to propagate blueberries by tissue culture. This procedure allows for very rapid proliferation of certain cultivars, but also requires an expensive, specialized laboratory.

The growing tips of plants are removed under sterile conditions and placed in a special growth medium in growth chambers. The resulting plantlets are carefully rooted under high humidity in a greenhouse and are generally sold in transplant trays.

Other Propagation Methods

The following methods of propagating are mainly used for research or propagation of only a few plants:

Mounding

In this system, severely prune the mother plant, cutting back canes and young whips to 6 to 12 inches above the ground. Fertilize and then build a wood or tar paper frame around the plant and fill this with a rooting medium. After 3 years, remove the frame. One-sided root systems are produced near the base of the stems. After cutting below the roots, the plants are ready for transplanting. This method is rarely used.

Seeds

Seeds can be used for propagation but are mainly used in breeding programs as plants do not breed true to type. The seeds need to be exposed to light to germinate, which takes 3 to 8 weeks. Seeds are sown on the surface of sphagnum peat or a 1:1 mix of sphagnum and sand. The medium must be kept moist.

Grafting

Budding involves grafting a single bud onto another plant. Bud when the bark slips easily in the spring. Rubber grafting bands are good wrapping material to fasten the buds to the branch. Other types of grafts used are the cleft, whip, side, and T-bud. Budding and grafting are not commonly used because blueberry plants are rejuvenated by suckers below the graft or bud unions. Within 4 to 6 years, these unions will be pruned out.

This fact sheet is adapted from Oregon State University Extension
Publication PNW215, Highbush Blueberry Production.

The authors of Highbush Blueberry Production are - Oregon State University:
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Shanks; University of Idaho: Dan Barney.

ANNEX VI : Elemental Sulfur to Amend Soil pH

Elemental sulfur* needed to lower pH to 4.5 (kg/hectare)			
	Soil type		
Current pH	Sand	Loam	Clay
5.0	195	589	889
5.5	389	1145	1778
6.0	589	1712	2556
6.5	734	2245	3368
7.0	934	2845	4257
*To convert sulfur to ferrous sulfate, multiply by 8.			

ANNEX VIII : Manufacturer Quotations for Pack-line Equipment

Quote #1

Lakewood Process Machinery
875 Brooks Ave.
Holland, Michigan 49423
USA

Direct: 616.796.9304 New

Office Main: 616.392.6926

Some of the model numbers / pieces of equipment that you have listed below have been updated or discontinued, but what you sent over does give us a good idea of what you want to do, and I will try to list out what those current options are here.

1. As far as an air cleaner goes, we have discontinued the FP24 model, and are now offering a Model # 14125 / 32" wide no drop air cleaner with stainless steel wire belt and a metering hopper for **\$16,900**
 2. Model # 16000 / Soft Berry Tilt Belt **\$12,500**
 3. Model # 10120 / 32" wide Inspection Conveyor with Trash Lanes and Lug Rack, Stainless Steel Wire Belt **\$15,275**
 4. Model # 31000 / CS1 Volumetric Clamshell Filler (for 4.4 oz cups, 6 oz, and pints) **\$16,650**
 5. Model # 17100 / Rotary Packing table **\$2,450**
- Total \$63,775**
6. Add Model # 15506 / Clamshell Wheel Denester for an additional **\$2,775**

Just to put this into perspective, we do offer our Top-of-the-line 'Standard' fresh line for about \$10,000 more than this, which would allow you to run the volume you need + leave plenty of room to grow. Going this route would upgrade the Air Cleaner to a MKBN Style Air Cleaner, which is highly recommended, and just all around an awesome machine for the money (Video: <http://lakewoodpm.com/videos/mckibben-style-air-cleaner-model>), and would upgrade the filler to an 'SLA' Single Lane Adjustable Volumetric Clamshell Filler which can handle any cup size from 4.4 oz up

to 2 lbs / is completely hand adjustable (no tools necessary) / is rated up to 120 pint sized clamshells per minute / includes a powered paddle closer and spilled berry conveyor to keep all spilled berries off of the floor (Video: <http://lakewoodpm.com/videos/single-lane-clamshell-filler>). The upgrade would also bump the denester up to a scissors denester which can handle all the same cup sizes as the SLA filler and is fully hand-adjustable to allow for quick and easy changeover (Video: <http://lakewoodpm.com/videos/scissor-style-denesting-of-clamshells>)

I hope this gives you a little bit better of an idea of what we have to offer / what direction you might want to go. If you have any questions at all, please do not hesitate to contact Shaun or myself.

Steven Bakker

From: Shaun Harcourt
Sent: Thursday, July 28, 2011 8:41 AM
To: Steve Bakker
Subject: FW: Line Equipment for Blueberry fresh pack

Shaun Harcourt
Mobile: 616.218.6913
Fax: 616.392.8977
Email: shaun.harcourt@lakewoodpm.com

Web: www.lakewoodpm.com

Quote #2

A&B Packing Equipment
67602 62 Street
Hartford, Michigan 49057
USA

Quote to: USAID-NOA,
Quote Number: 91049 Contact: Richard Dale, STTA Consultant
Quote Date: 08/09/11 Inquiry:
Customer: USAID-NOA Terms: 50%down/50% before shipment
Salesman: Josh Gray
Ship Via: Bestway FAX:
Expires: 09/08/11

Item Description	Quantity	Price
1 CDT3010 DOVETAIL FEED SYSTEM 30" wide x 10' long Adjustable feed rate hopper system Gentle no-rub fruit handling design	1	\$7,470.00 /EA

Stainless steel constructed Crescent top belt Variable speed direct drive Power Supply North America 120 volts-5 amps		
2 RBC30 30" ROTARY BLOWER CLEANING SYSTEM Triple separation Variable speed hollow bore drive Stainless steel constructed Push button variable speed air flow control Self cleaning rotary screen Power Supply North America 120 volts/ 5 amps and 220 volts/ 20 amps	1	\$14,600.00 /EA
3 CTB3006 TILT BELT SORTER 30" wide x 6' long Plastic belt Stainless steel constructed Variable speed hollow bore drive	1	\$8,250.00 /EA
4 CTL3612 TRI-LANE CONVEYOR 36" wide x 12' long Gentle low drop discharge pulley Lay flat no fray belt Special self cleaning drive pulley Stainless steel constructed Variable speed hollow bore drive 120 volts/ 5 amps	1	\$9,270.00 /EA
5 CZ181003 "Z" Conveyor (18" Wide) (10' Upper - 3' Lower) Special design incline conveyor Gentle on fruit Reversible belt Variable speed hollow bore drive Stainless steel constructed Power Supply North America 120 volts-7.6 amps South America 220 volts-3.8 amps	1	\$6,270.00 /EA
6 PMUP9100 UP9100 HIGH SPEED PACKING MACHINE Gentle patented filler metering system Patented berry settling system to help reduce berry fall thru High speed guillotine denester	1	\$21,970.00 /EA

Stainless steel constructed
Denester and closer
North America 120 volts-10 amps

7 TT5	1	\$3,770.00 /EA
5' TURN TABLE		
Variable speed hollow bore 400/1 double reduction gear drive		
Nylon table top		
Stainless steel constructed		
8 QAUS	1	<u>\$0.00 /EA</u>

Total: \$71,600.00

ALL PRICES IN QUOTE ARE IN US CURRENCY
Please sign and fax back to 269-621-0300 if accepting.
By Josh