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***Consultancy Report: Evaluation of Snowpea Production/Marketing in  
Kigezi, Uganda***

***Uganda: Cooperative Agriculture and Agribusiness Support Project  
617-0111-C-00-9100***

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## EXECUTIVE SUMMARY

In February, 1993 trial plantings of snowpeas were made in the area around Kabale, Uganda. When these plantings performed well, the trials were expanded to include 72 farmers and shipments were made to the U.K. and to Belgium where they were well received. A number of problems did however develop and this evaluation was requested to review the project both from a horticultural and marketing point of view and also from the economic point of view. The following are some of the key findings of the review:

1. Though progress has been made in teaching farmers to grow and harvest snowpeas, a much stronger extension effort will be needed if the project is to succeed.
2. There was no continuous technical assistance over the past year resulting in confusion and the inability to discover and correct problems early. If the project is to succeed continuous, on-site technical assistance will be necessary for at least a year.
3. Only one cultivar, *Pennine*, has been utilized in the trials and cultivar trials to evaluate a range of cultivars including sugar snap peas should be initiated.
4. Unreliable data from previous trials make it difficult to positively evaluate the economics of the project, however, with an increase in the scale of production, export only during the months of October to May, and better disease control and harvesting, the project should be economically feasible even with the conservative yields used in the financial projections.
5. The current packing house is adequate for the expanded trial suggested for the next season although when full scale commercial production begins a packing house approximately 4 times as large will be needed. A refrigerated cooler will also need to be constructed. Probable sight for the packing facilities is Mahanga on the main road where electrical power is available.
6. Present transport utilizing a Mitsubishi truck is adequate for the expanded trial, however, for commercial production 2 insulated "Tata" lorries will be necessary.
7. The present exporter was involved in exporting from delivery to the airport in Entebbe to sale in Europe. This role is adequate for the next expanded trial, however, it would be desirable for the exporter to control the product from packing and cooling in Mahanga to sale in Europe. The upcoming trial would have to demonstrate the profitability of the project and credit would have to be available for him to be interested in this.

8. The Kigezi Cooperative Union provided credit, bookkeeping, some manpower, transport, and knowledge of local farmers' skills. It is the best organization for the present to provide these services, but lacks business acumen and the aggressiveness to effectively market members' produce. Ultimately, a more businesslike organization would be useful.
9. There are no serious adverse environmental effects at the present time resulting from snowpea cultivation providing that bamboo tops are used for trellising. Eventually competition for water with domestic users in Mpalo may be a problem.
10. Variety and demonstration trials should be conducted in the period April through July to be followed by expanded commercial trials in the period August to May. The goal of the commercial trials will be to resolve existing problems, and to document the profitability of the enterprise so that a private company can be interested in taking over the project.
11. Full scale commercial production should commence in August of 1995 assuming that the previous trials were successful. Capital will be required for construction of a packing shed, cooler, and for purchase of trucks.
12. Individual plot size should be limited to 300-500 square meters in order to insure that peas are well cared for and that labor requirements will not exceed that available from family labor without diversion of efforts from subsistence crops.

EVALUATION OF SNOWPEA PRODUCTION/MARKETING  
IN KIGEZI, UGANDA

by

Robert P. Rice Jr.

Introduction:

The area around Kabale, Uganda has a history of production of high quality vegetables for sale primarily in Kampala. In the sixties with the expulsion of the Asian population from Uganda a large part of the market was lost and some vegetable production began closer to Kampala. At the same time there was a loss of morale due to the political turmoil and the Kigezi Cooperative Vegetable Union has never made serious attempts to regain their markets. The result has been that there is a dearth of cash crops in the area resulting in a lack of cash income. In February 1993, in an attempt to develop profitable cash crops in the area, initial trial plantings of snowpeas (*Mange Tout*) were made in Kigezi, Uganda around Kabale. These initial plantings though plagued by disease demonstrated that snowpeas did well in the area. This led to larger plantings involving 72 farmers which were aimed at demonstrating that peas could be successfully grown on a larger scale and that they could be successfully exported to European markets. Due largely to lack of continuous technical assistance, these plantings also experienced problems mainly related to disease control and to correct picking and post-harvest handling, however, export shipments were made and were received enthusiastically in Europe by importers anxious to diversify their sources of supply. The purpose of this evaluation which is occurring one year after the initial plantings is to evaluate the problems encountered thus far and to make recommendations relative to the future of the project.

Scope of Work:

1. Evaluate and appraise the extent to which farmers understand production of high value crops for export including cultural practices, pest\disease control, timeliness of harvest and the importance of proper field sanitation.
2. Determine if the varieties currently being used are appropriate.
3. What are the cost\benefits to the farmers for production of snowpeas?

4. What is the effect of post harvest handling?
  - a. appropriate packing facilities
  - b. cooling/pre-cooling
  - c. transportation to point of export
5. Examine the extension services provided to farmers on production and recommend how they can be strengthened and made more effective.
6. Examine the actual role played by the exporter and recommend if the role is adequate or should be revised.
7. Examine the actual role played by the Kigezi Vegetable Cooperative Union and recommend what their role should be if any and how it can be modified.
8. Examine what environmental impact the project has had or may have in the future, especially in regard to use of chemicals, fertilizers, irrigation, and land use.

#### Methodology:

Approximately one week was spend in the Kabale area. During this time farmers were visited, field plots viewed, spraying systems evaluated, water sources reviewed and potential water use discussed with the district water engineer. Discussions were also held with the Snowpea growers committee and the Kigezi Cooperative Vegetable Union. Upon returning to Kampala discussions were held with Sam Katumba, the exporter and with USAID officials and contractors involved with the project. A draft summary of the evaluation and recommendations were prepared and presented to USAID.

#### Evaluation:

The report will follow the points in the scope of work and will be followed by recommendations and conclusions.

1. Evaluate and appraise the extent to which farmers understand production of high value crops for export including cultural practices, pest\disease control, timeliness of harvest and the importance of proper field sanitation.

The farmers involved in the snowpea project are in general good farmers and have demonstrated a good understanding of soil preparation up to and including the processes of planting and

trellising. The main areas of problems are in disease recognition and control, harvesting, grading, field sanitation, and irrigation. A considerable amount of extension effort will be necessary to provide the needed training to farmers which participated in the earlier plantings. As the project expands to provide season long exports a well designed and implemented extension program will be necessary to train the over 200 anticipated new farmers.

**2. Determine if the varieties currently being used are appropriate.**

The cultivar currently being used, *Pennine*, was selected for trial because it is the main commercial cultivar in Kenya. Another cultivar was tried on a very limited scale however it was grown from poor quality seed produced in Kenya. *Pennine* produced good quality pods which were generally acceptable to the market however some market reports indicated that pod color was lighter than optimum and that pods were slightly bitter and in some cases stringy. Though these characteristics were most likely related to post-harvest handling the development of these undesirable qualities can also be related to cultivar choice and adaptation to the environment. Other undesirable qualities of *Pennine* include susceptibility to disease, and height which requires tall trellises. Though snowpea germplasm does not have a great deal of resistance to disease, this character should be evaluated in trials. Additionally, shorter varieties would be useful when used with the bamboo trellising system providing that other characteristics were the same.

**3. What are the cost\benefits to the farmers for production of snowpeas?**

This question will be addressed primarily by the economist, who was the second member of the evaluation team. However a few general points should be considered when evaluating the economic impact of the snowpea project on the Kabale area. Firstly, since there are few marketable cash crops in the area, even a relatively small profit margin on snowpeas will be attractive to the farmers whose main cash crops now are wheat, sorghum, potatoes, and pyrethrum. The land in the area is largely terraced hillsides and do not lend themselves well to production of any quantity of wheat and sorghum. The addition of another cash crop, especially one that is labor intensive and will provide employment is desirable. Secondly, the Kabale area can produce very high quality vegetables, the problem being that the local market is small and transport to the main market in Kampala is too expensive. Once regular transport of snowpeas to Kampala begins it is highly likely that surplus freight capacity can be used for other vegetables and thus snowpeas may be the engine for a much wider development of crops in the area. A third point is that there are strong indications that snowpea yields are much higher than those used in the economic models. Unfortunately, the data is not reliable enough to be sure of these yields which

are substantially higher than in surrounding countries so they have not been used in profit projections. If during subsequent trials, the higher yields are verified, farmer profits will be much greater than projected.

#### **4. What is the effect of post harvest handling?**

Harvesting and post-harvest handling were a problem in the latest commercial trial. The greatest problem was due to ineffective extension and an unfair compensation system for farmers which resulted in harvesting of peas at an over-mature stage. Since the peas were over-mature, well over 60% of them had to be thrown away at the packhouse. This greatly reduced the efficiency of grading and overtaxed the capacity of both the cooling shed and the packing shed.

##### **a. appropriate packing facilities**

The present packhouse was made by partitioning part of an existing community building and constructing grading benches. This building is adequate for the expanded commercial trials suggested. When fully commercial scale production commences a packhouse about 4 times as large will be necessary to efficiently pack the increased output.

##### **b. cooling/pre-cooling**

The adiabatic cooling shed in use for the last trial was well suited for the small commercial trial and could if necessary be used for the expanded commercial trial suggested. It is definitely not adequate for commercial production. During the coming year, for the commercial trial, the purchase or rental of a refrigerated container should be investigated. Though this would be more expensive than the present structure, the ability to lower temperatures much closer to the ideal 0-4 C would increase the chance of commercial success with the trial.

##### **c. transportation to point of export**

Transportation using the present Mitsubishi truck is barely adequate for the trial suggested and assumes that no serious breakdowns occur which since the truck is new is probably not unreasonable. Additionally the sides will have to be raised to accommodate 450 boxes/trip which is the anticipated output. When commercial production begins two larger insulated trucks will be necessary ("Tata" lorries). The closed insulated trucks will help to maintain low temperatures during the 9-10 hour trip to Entebbe. Two trucks will be necessary since trips will be made 4 times per week and the risk of breakdown is too great to operate for long with only one truck. Since the cost of transport from packhouse to airport is a major cost the economy of scale in using the larger trucks will be critical in the economics of the venture.

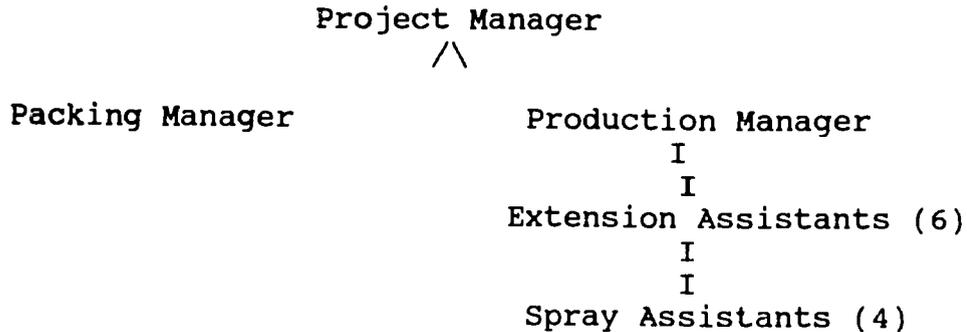
**5. Examine the extension services provided to farmers on production and recommend how they can be strengthened and made more effective.**

As mentioned previously, extension services were a major problem in the previous trial. Present extension is totally inadequate for the number of farmers involved in the previous trial and with an anticipated increase in farmers from about 72 to over 300 in the next stage of trials a well planned and executed extension program will be necessary.

A two step approach to extension is suggested in order to (a) get the next stage off to a running start and (b) insure that adequate extension is available for problem solving during the production season.

The first step would be to organize demonstration plots during the coming season. Two plots are suggested, one on the Bunyoni road and one in Mpalo. These plots would accomplish two objectives: (1) the extension workers would provide all the labor for the plots so that they would gain hands-on experience with all phases of crop production, (2) field days would be organized to demonstrate all phases of production. Farmers who plan to grow during the next commercial stage would be required to participate and would be trained at the demonstration plots. This phase is necessary because when production actually begins, there will be too many new farmers to effectively educate them during the production season. During this phase, farmers should actually be involved in as many processes as possible. For example, during harvest, farmers should actually perform some of the harvesting and grading in the demonstration plots.

The second step will be to have in place a well organized extension system to visit farmers during the production season. The suggested organization of the project management/extension system follows:



Initially, the project manager position would be filled by an expatriate advisor and a Ugandan counterpart. Eventually as the project matures and there is less training necessary the Project manager could probably do the jobs of both the Packing manager and the production manager thus decreasing the cost of the extension program. The main cost of the extension systems will be for transport. One pickup truck and one motorcycle will be necessary as well as bicycles for each extension worker. Extension workers should be assigned farmers to visit and should be required to keep a notebook which is signed by farmers when visited. Likewise the extension workers will sign the farmer's notebooks during each visit. This will ensure that visits actually occur as frequently as desired.

**6. Examine the actual role played by the exporter and recommend if the role is adequate or should be revised.**

During the last commercial trial, the exporter with assistance from EPADU (Export Promotion and Development Unit) and High Value Horticulture assumed responsibility for the produce from the time of delivery at the airport to its sale on the European wholesale market. This arrangement would probably remain the same in the next trials, however, once the exporter is convinced of the viability of the project, he should be encouraged to take charge of the product from the time of delivery to the packing shed to sale in Europe. The advantage of this is that the exporter would control quality throughout the entire post-harvest handling chain. Eventually, he might want to operate the entire scheme including production. Ultimately, placing the entire project in private hands would be beneficial however, no exporter will assume that risk until it has been amply demonstrated that the project is profitable. Even at this stage the exporter will require credit assistance to construct a cooler, packing shed, and to buy trucks.

**7. Examine the actual role played by the Kigezi Vegetable Cooperative Union and recommend what their role should be if and how it can be modified.**

In the previous trials the union provided the following services

- (a). provision of credit to farmers
- (b) bookkeeping
- (c) provision of some employees
- (d) transport
- (e) knowledge of farmers including skills and credit worthiness

In the last trial there was not a clear division of responsibility between the Union and personnel provided by the CASS (COOPERATIVE AGRICULTURE AND (Cooperative Agriculture and Agribusiness Support Project) project resulting in confusion and mischarging of farmers for inputs. This has resulted in farmer resentment and distrust of the union. It is likely that if communication were improved, the union could provide the above services at a low overhead cost. The main problem associated with using the union as the main overseeing organization for the project is that the union lacks aggressiveness and business acumen and without strengthening of these skills is not the ideal organization to provide overall management for the project. In the period until a private firm can be interested in the project by demonstration of its profitability they should however continue in this role. Their ability to perform can be strengthened by working closely with the expatriate advisor. Consideration should also be given to employing a business oriented manager who might be paid on a salary plus commission basis to try to turn the union around.

The most serious management problem in the last trial was associated with farmers being charged for inputs they didn't receive or farmers not understanding how much certain inputs were going to cost. These problems would be eliminated by using the notebook system discussed above. All inputs would be entered in both the farmer's notebook and in the union record book and the parties involved would cross-sign the books. The same system should be used upon receipt of produce at the packing shed.

A Snowpea Committee consisting of farmers elected by the other snowpea growers in Mpalo has formed. This group is useful in insuring good communications between the growers and the union or other managing body. It has been suggested that they might take over the management duties of the union however they lack the bookkeeping and business skills of the union so it is doubtful that this will work. They will serve as a useful information conduit in the coming trials.

**8. Examine what environmental impact the project has had or may have in the future, especially in regard to use of chemicals, fertilizers, irrigation, and land use.**

At the present time, no detrimental environmental impact has occurred, however the potential for adverse environmental impact exists if it is not managed carefully. The following are the primary concerns:

**Deforestation:** as the area under snowpea cultivation increases there will be a large demand for trellises. If the original trellising system which utilized gum poles were continued a significant impact on the limited tree lots in the area would occur. Fortunately in the last planting a trial was initiated using bamboo tops which are waste from the cutting of bamboo in a bamboo forest about 30 km away. This has worked well although some selection is necessary since some were too short. This system will have no adverse environmental impact and will be more cost effective as well.

**Capacity of Gravity Water System:** A domestic gravity water system was utilized in Mpalo to provide irrigation water for approximately 4 acres of peas. During the last crop, problems developed in the system and there was some concern that this was due to the irrigation demand exceeding the capacity of the system. It was found that the problem was not due to lack of capacity in the system but rather to users leaving taps running all the time and to several unrepaired breaks in the system. Since then, an additional feeder source has been added to the system and another is nearly completed. The district water engineer has advised that the water usage for irrigation could double without a problem and that he is in favor of this usage of the overcapacity of the system. The impact of water consumption for irrigation can be further decreased by:

- (a) less irrigation as plants are currently being over-irrigated
- (b) irrigation at night when domestic use is minimal
- (c) the use of mulches to conserve water

It should be noted that there will eventually be competition for the water in the gravity water system but this should not occur for many years.

**fertilizer:** due to the inherent fertility of the soil no fertilizer other than manure is recommended, and since the peas fix nitrogen some soil enrichment utilizable by rotation crops will occur.

**pesticides:** pesticide usage is minimal and if recommendations in this report are followed impact will be minimal. Switching to smaller plots will also increase the likelihood that insect populations (aphids) will be at least partially controlled biologically.

**soil erosion:** part of the land is hilly and is currently partially terraced decreasing soil erosion. Peas are grown on ridges which if located along the contours will also help to

control erosion. Suggestions for improvement include teaching farmers to determine where the contours are using a simple A-frame, and mulching.

land use: some shifting from subsistence crops to snowpeas occurred in the last trial because plots were too large. Limiting plot size will insure that farmers continue to grow their subsistence crops and that only land used for other lower value cash crops is diverted to snowpeas.

Recommendations:

1. The snowpea project should continue and be gradually expanded to reach a minimum level of production equal to 900 boxes per day of packable output (18 ha/planting or a maximum of 36 ha in the ground at one time). Expansion must occur in phases and be carefully coordinated with provision of infrastructure and extension services.
2. Production for export should be timed to produce exportable product during the months of October through May inclusive when market prices in the U.K. average better than US\$4.25/ kg making production profitable.
3. Farmers who grew snowpeas in the last trial should be advised immediately that commercial plantings will not occur until August and they should therefore plant other crops in the meantime. Those who will participate during the next season should plan to have irrigable land ready for an August planting. Farmers whose land is not close to a water source should not be permitted to grow snowpeas as a good quality product cannot be produced reliably without irrigation.
4. The months of March to July inclusive should be utilized to hire and train personnel, recruit an expatriate advisor for a minimum of a one year and preferably longer contract, select and organize farmers, obtain inputs, plant variety trials, and plant demonstration plots for farmers to maintain enthusiasm and develop snowpea production, harvesting, and grading skills.
5. Since the choice of cultivar is the single largest horticultural factor in determining the success of a crop, cultivar evaluations should be conducted as soon as possible. Trials should be conducted at three sites including one with peat soil, one in the Mpalo area, and one along the Bunyoni road. Qualities to be evaluated include yield, quality, powdery mildew and aschochyta/bacterial blight resistance, length and distribution of production, height, pod size and quality after simulated storage. In addition to snowpea cultivars sugar snap peas should be included in the trials since there is a growing market for these in Europe.

6. Demonstration trials should be conducted at Mpalo and along the Bunyoni road. Extension personnel should manage and perform all the labor for these trials to ensure that they are knowledgeable and have actually experienced the problems inherent in snowpea production. Field days/classes should be held at the appropriate time relative to the production of the crop to teach the following in particular:

- a. soil preparation, contour ridging utilizing an A-frame, manuring, trellising, and planting.
- b. pest control including birds, recognition of cutworm, aphid, and thrip damage, recognition of aschochyta/bacterial blight, and powdery mildew.
- c. irrigation including frequency and quantity utilizing watering cans and trickle (as appropriate in each area)
- d. mulching for water and soil conservation and to decrease weeding.
- e. picking to include methodology to prevent plant damage, timing and frequency, stage of pod development, and handling of pods between picking and packhouse.
- f. grading--each farmer should grade peas until they are able to successfully distinguish between exportable and non-exportable peas.
- g. field sanitation and composting--farmers should be shown how and when to remove plants from the field and how to make compost pits.
- h. rotation--the importance of rotation and the need to keep new plantings a minimum of 500 m away from old plantings to minimize disease must be stressed.

7. Farmer production plots should be limited to 300-500 square meters in size in order to improve plot maintenance and timeliness of harvest. Limiting plot size will also permit family members to provide most of the labor without competing for labor needed for subsistence crops. With smaller plots, supplemental irrigation with watering cans will also be possible.

8. The present cooler and packing facilities can be utilized for one more trial beginning with August plantings. If possible, cooling facilities should be augmented by leasing or purchase of a reefer. Plans should be initiated to finance and build a refrigerated cold store and packing shed at Mahanga to handle 900 boxes/day minimum of exported peas. This facility must be in operation by September of 1995. The facility should be designed to be expandable to handle a larger throughput of peas as production increases.

9. The trial planting to begin in August should be large enough to produce continuous production of 225 exported cartons per day during the export season. This will involve approximately 4.5 hectares per planting and 4 plantings spaced 7 weeks apart, which means that at any given time, 9 hectares will be in snow peas. Goals of this trial will be as follows:

- (a). Resolve management and extension problems
- (b). Obtain financial data to demonstrate profitability
- (c). Train at least an additional 120 farmers in snowpea production and harvesting
- (d). Fine tune production, packing, and harvesting systems
- (e). Devise rotation and sequential planting plans to insure continuous sustainable production
- (f). Train an additional 6 extension workers and ensure that the extension system is working well.
- (g). Improve the operation and efficiency of the Kigezi Cooperative Union in management of the project.

10. Cultural practices should be somewhat revised as follows:

(a). Spraying for disease prevention must emphasize thorough coverage and should occur on a 10 day average schedule but must be responsive to discovered disease outbreaks. Farmers must know what the schedule is and must be told to identify and report disease outbreaks immediately so that curative sprays can be used so that plants enter the harvest period disease free.

(b). An anionic surfactant should be substituted for the present non-ionic surfactant being used.

(c). Heavy use of benomyl (Benlate) should be stopped. Preventative sprays should consist of copper oxychloride, wettable sulphur, and dithane in rotation. Benomyl should be used immediately upon and only after discovery of disease symptoms. Resistance to benomyl develops rapidly and therefore it should be used only when absolutely necessary. If bacterial blight is present, the only pesticide which will limit its spread is copper.

(d). Amounts of water applied should be carefully monitored and decreased from the amounts applied by drip irrigation during the last planting. Eventually a class-A evaporation pan should be used to schedule irrigation.

(e). Mulches should be used in all plots but growers should watch for rodent damage.

(f). Bamboo tops should be used for trellising in all plots and selection of tops for the tallest ones should be done.

(g). Sequential plantings should be isolated from existing plantings by at least 500 m to limit disease spread.

(h). Mature plants should be removed from the fields and composted in compost pits (technique to be taught at demonstration plots) immediately after harvest is completed.

(i). Rotations to non-leguminous crops to follow snowpeas, preferably sorghum, maize or wheat.

(j). Plants in individual plots should be examined for nodulation and if this is not occurring, inoculant should be used on subsequent plantings to insure that adequate nitrogen fixation is occurring.

## Conclusions

In previous plantings snowpeas grew well and were well received by European buyers. A number of problems including communication with farmers, harvesting at the wrong time, irrigation, disease, and packhouse management and recordkeeping prevented of sufficient data to make a convincing economic case for interesting the private sector in taking over the project from being obtained. Most of these problems were due to the rapid expansion of the project from 5 farmers to 72 without continuous technical support. It is believed that the project will be profitable but requires long term technical support for at least the next year to insure that problems are resolved and that the further expansion envisaged occurs smoothly. Due to the potential gains to farmers in the Kabale area who lack sufficient cash crops, the strong interest by farmers, and the non-traditional export which will result from this project it is recommended that USAID continue to support the snowpea project by provision of technical and other assistance for the suggested cultivar, demonstration and expanded commercial trials.

## APPENDIX I

Some suggested snowpea and sugar snap cultivars for trial:  
 (note: James Cartwright should also be contacted since he has recently been contacted by a European seed company interested in doing some cultivar trials in Uganda.)

## Snowpeas:

Manoa Sugar (Univ. of Hawaii release--contact the Horticulture Department at the Univ. of Hawaii, Manoa, HI.

Oregon Sugar Pod: short vines which require lower trellises, resistance to several pea diseases (but not mildew, or blight), pods are small, but quality is good.

Mammoth Melting Sugar: heavy producer of large pods on tall vines, may bring lower price due to pod size, but worthy of trial

Oregon Sugar Pod II: similar to Oregon Sugar Pod but with some tolerance to powdery mildew, Enation Mosaic, Pea Streak Virus, and Fusarium wilt.

Snowflake: dwarf vines, some disease tolerance

Super Sugar Mel: vines to 1 m are tolerant to powdery mildew, large pods to 10 cm may have to be harvested early to obtain premium prices, high quality.

## Sugar Snap type:

Sugar Snap--tall vines require 1.5 m trellis

Sugar Ann--short vine do not require trellising however pod may be smaller than desired for market

Sugar Daddy--a stringless sugar snap which does not require trellising

Snappy--tall vines to 2 m, tolerant to powdery mildew