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Title: Feasibility, Cost Effectiveness, and Showcasing of Haskap (Honeyberry), Lonicera caerulea and Hardy Kiwi (Actinidia arguta) production in Pennsylvania

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Proposed Project Period: 04/01/2018 - 3/31/2019 **Total Project Request:** \$5,532

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Please reference PSU Ref. Number in all correspondence.

State Horticultural Association of Pennsylvania
Research Grant Proposal: January 4, 2018
Research Committee

Feasibility, Cost Effectiveness, and Showcasing of Haskap (Honeyberry), Lonicera caerulea and Hardy Kiwi (Actinidia arguta) production in Pennsylvania.

Personnel: **Jody Timer:** Department of Entomology: E-mail: jht10@psu.edu
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Duration of Project: One-year project: 2018 -2019.
Budget is for April 1, 2018 – March 31, 2019

This research addresses the 2018 SHAP Topical Priority: Alternative Fruit and Berry
Crop Research

Justification:

Climatic change and economic pressures over the past several years have created formidable challenges for fruit crop producers of Pennsylvania. Harsh winters and late spring frost over the past seasons have damaged or destroyed tree fruit and grape crops with reduced yields. An ever changing market and an increase in growing cost has resulted in lower per unit returns for growers especially grape producers. Pennsylvania is the 5th largest producers of grapes in the country, however juice grapes realized historically low payment in 2017. In order to remain competitive in an increasingly more complex worldwide economy, growers could benefit from diversifying their operations with new crops that show potential. These new crops should be consistent with the growing conditions of existing fruit tree orchards, blueberries, raspberries, strawberries, and juice and wine grape vineyards that currently dominate the landscape. If successful, these new crops may serve to supplement the growers' income, especially in adverse years. In 2014, we planted two unique crops at Penn State University's Lake Erie Regional Grape Research and Extension Center, in North East Pennsylvania (Erie County) to supplement our grape research acreage; Haskap (*Lonicera caerulea*) and Hardy Kiwi (*Actinidia arguta*).

Haskap or blue honeysuckle, is an extremely cold hardy, edible berry producing plant, resisting temperatures as low as -46C (-50.8F) (Thompson 2008). Even flowers can be

exposed to temperatures of -7°C (19.4F) with no detriment to fruit set. Haskap is also tolerant of a wide range of soil pH (Retamales and Hancock 2012) allowing for production in many different soils throughout Pennsylvania. The fruit development period for Haskap starts very early in spring and is very short; 6-8 weeks from bloom to harvest (Thompson 2006). In northern Pennsylvania climate, Haskap will produce fruit as early as mid-June, coinciding somewhat with the strawberry market. The small blue fruits have a fresh, somewhat tart, raspberry/blueberry flavor. These plants do not sucker, need little pruning, and tend to fruit when very young. A Haskap bush can be productive for 30 years. Haskap is native to Siberia and northeastern Asia (Bors et al. 2012), and was recently introduced to the North American market being advertised for its many claimed health benefits. Some researchers (Bors et al. 2012) believe that haskap could replace blueberries as the new 'super fruit'. Its juice has 10 to 15 times more concentrated color than cranberry juice. The fruit is high in Vitamin C, Vitamin A, fiber, and potassium. The berries also have an extremely high ORAC value, Anthocyanin, Poly Phenols, and Bioflavonoids. In addition to fresh market potential, haskap can be used in processed products: pastries, jams, juice, ice cream, yogurt, sauces, and candies. The Canadian market is realizing about \$13.00 per pound, while the Japanese market is about \$30.00 per pound. (LaHave Forests' Haskap Day) Haskap is also used to make wine of a rich burgundy color. The antioxidant levels are measured using the ORAC (Oxygen Radical Absorbance Capacity) method. A wide variety of food has been tested using this methodology, with the Haskap Berry being rated very highly in comparison with other berries.

Fruit Comparison Table (per 100g)

Fruit	Potassium mg	Calcium mg	Phosphorus mg	Iron mg	Vitamin A ug	Vitamin C mg	Vitamin E mg	Energy kcal
Haskap	190	38	25	0.6	130	44	1.1	53
Pomegranate	236	10	36	0.6	0	10	0.6	n/a
Blueberry	70	8	9	0.2	55	9	1.7	49
Orange	130	17	12	0.1	60	35	0.4	39
Grape	130	6	13	0.2	15	4	0.3	56
Apple	110	3	8	0.1	11	3	0.2	50

Five revised standard tables of Food composition in Japan (Resources Council of Science and Technology Edition)

Though Haskap is touted as having few disease and insect pest problems, the plant can be negatively impacted by sunburn and mildew. As part of this project, we propose to examine the potential for these disease and insect pest problems.

Hardy Kiwi is another cold climate crop that can survive temperatures as low as -40° C (-40F) during winter dormancy. The fruits are the size of a large grape with a smooth, non-fuzzy, opaque green skin. Fruits hang in long, heavy clusters and mature vines can be extremely productive for many years. The fruits have small seeds and can be eaten out of hand without peeling. Sweeter than fuzzy kiwis, they have excellent flavor, and can be dried or made into wine. Hardy kiwi fruits are higher in Vitamin C than most citrus fruits. Hardy kiwifruit is grown on a trellising system, and is a strong perennial vine with small leaves and bright red stems which can grow to 40 feet in length. Plants usually fruit by their fourth year. Once established, plants can live for fifty or more years. The fruit quickly sizes after pollination and reaches its full size in the middle the summer. However, the remaining portion of the season is required to mature the fruit. Harvest usually takes place in late September and the fruit are picked before they are ripe. Fruit taste better when picked, refrigerated and ripened as opposed to ripened on the vine. Therefore picked, unripe fruit can be held in storage for up to 2 months while ripening.

Our Hardy Kiwi and Haskap plantings were established in 2014, and now include five varieties of Haskap (Tundra, Indigo Gem, Berry Blue, Blizzard, and Indigo Treat) and three varieties of Hardy Kiwi (Anna (Ananasnaya females) with pollinator males of 74-32 and Fave). We harvested our first full crop of Haskap in 2017 and a partial crop of Kiwi. We have been collecting yearly phenology data to determine hardiness, yield, disease resistance, and harvest results on these crops. This fall we replanted five Haskap bushes with a newer cultivar breed (Blizzard) bred to be hardier and more prolific. We feel these crops are mature enough to showcase in a field day event at our facility in the fall of 2018. We expect to have enough fruit for display and taste testing at a grower field day.

Objectives:

1. To collect phenology data for Haskap and Kiwi for the creation of a historical knowledge base or reference of plant development, useful to growers of these two crops.
2. To observe and record potential abiotic, insect pest, and disease problems that growers may encounter during the establishment of these two crops. The knowledge gained may be used to evaluate the need for future insect pest and disease management research projects.
3. To develop a basic cost analysis for Haskap and Hardy Kiwi production.
4. Organize a Grower Field Day in the fall of 2018 at LERGR&EC, designed to introduce alternative crop production possibilities to Pennsylvania growers, processors, and brokers and to solicit their input.

Procedures:

Regular, weekly assessments will be made to record growth and reproductive development throughout the season. In early spring, five shoots of each Haskap variety, and one shoot of each of 10 female 'Anna' Hardy Kiwi vines will be flagged for measurements (shoot length and leaf number from bud break to bloom, timing of bloom, fruit set, onset of ripening, and maturity/harvest). At each assessment, we will observe for any disease and insect pest problems, as well as effects from abiotic climatic factors (drought, sunburn, etc.). Costs associated with weed control, watering, crop protection (netting for birds, etc.) will be recorded and summarized. Fall of 2018, a field day will be held at the Lake Erie Regional Grape Research and Extension Center to showcase these alternative crops. At the field day, growers, potential processors, and interested homeowners will receive information regarding production and development of these crops, as well as a summary of our observations over the past three seasons (handouts). Attendees will also be asked to sample and rate the fruits for quality and potential on the fresh fruit and processing market. Since the haskaps mature by end of June, we may have to supplement the haskap tasting with frozen berries and processed haskap products. The information gleaned will form the basis of a brief report on the potential of these crops in PA that will be issued via email to each participant.

References Cited:

1. Bors, B., Thomson, J., Sawchuk, E., Reimer, P., Sawatzky, R., and Sander, T. 2012. Haskap breeding and production-final report (pp. 1-142). Saskatchewan Agriculture: Regina.
2. Retamales, J.B., and Hancock, J.F. 2012. Nutrition. In J.B. Retamales and J.F. Hancock (eds.), Blueberries (pp. 103-142). Wallingford: CABI.
3. Thompson, M.M. 2006. Introducing haskap, Japanese blue honeysuckle. *Journal of American Pomological Society* 60:4:164-168.
4. Thompson, M.M. 2008. Caprifoliaceae. In J. Janick and R.E. Pauli (eds.), *The Encyclopedia of fruit and nuts* (pp. 232-235). Wallingford: CABI.

Budget Narrative:

The funds requested from SHAP will be used toward labor costs for data collection with regular, consistent measurement of both crops. These measurements will include development parameters (data recording and report materials, sampling bags) and plot maintenance. SHAP funds will also be used to fund the Field Day at LERGR&EC. Expenses will include food, handouts, and guest speakers.

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State Horticultural Association of Pennsylvania

Project Dates 04/01/2017-03/31/2019 Budget for 04/01/2017-03/31/2018

Principal Investigators:

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	04/01/2018 -03/31/2019
Direct Costs	
Salaries (Category 1)	
Timer, Jody H. (Principal Investigator)	0
<u>Hed, Bryan. (Principal Investigator)</u>	0
Total Salaries	0
Wages (Category I)	
<u>Fixed Term Laborer</u>	2,000
Total Wages	2,000
Fringe	832
Category 1 @41.60%	
Total Wages and Fringe	2,832
Modified Total Direct Costs	2,832
<u>Travel</u>	
Registrations, meetings	
In-State	250
Domestic (CONUS)	250
<u>Supplies</u>	
Plastic bags, clippers, notebooks, containers,	200
<u>Field Day</u>	
Food, meeting expenses	1,125
Handouts, materials	150
Guest speaker expenses	725
Total Modified Total Direct Costs	
Total Direct Costs	
Total Requested from Sponsor	5,532
Total Project Costs	5,532