Adding Value to Honey Products Through the use of Melissopalynology Techniques

Final Report for FNC03-454

Project Type: Farmer/Rancher
Funds awarded in 2003: $6,000.00
Projected End Date: 12/31/2005
Matching Non-Federal Funds: $10,400.00
Region: North Central
State: Minnesota
Project Coordinator:

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Ames Farm

Project Information

Summary:

PROJECT BACKGROUND
Ames Farm Limited is a small farm network, based in central Minnesota. Our operations consist of managing 1,800 apple trees spread over several properties in the nearby area. In addition, we manage 300 honey bee colonies which also are spread out over a 100 mile radius in Minnesota. The unique feature of our honey producing operation is that we segregate the honey by 17 different sites and also by floral source. So a jar of our Single Source Honey has the location and floral source information printed on the label. Customers can look up their jar on our web site after purchase to learn more about when and where it was produced.

Ames Farm has always practiced sustainable farming techniques in all aspects of our operations. We use IPM techniques for making a determination of when to treat our apple trees and honey bees for disease or pest damage. The focus of this project though was concerning the creation of value added techniques to make the small scale honey producer's economic existence sustainable. Very few small scale beekeepers are left in the USA as the wholesale price for honey has been at or below the break even point for many years.

PROJECT DESCRIPTION AND RESULTS
The goal of the project was to acquire the necessary equipment and knowledge to perform pollen analysis on honey samples. An important part of the project was the involvement of a recent University of Minnesota (U/M), Biology Masters graduate, Elaine Evans, as a consultant. Elaine completed her Masters thesis on pollen analysis.

The first step in beginning the project was doing further research on the appropriate microscope equipment. When I wrote the grant proposal, I envisioned creating a digital photo database of pollen samples to use as a reference collection. Each plant in nature produces a uniquely shaped pollen grain. The unique color, shape, size, and texture of each grain can be used to compare visually to a reference sample to

help identify the floral source.

Initially a microscope was used at the U/M Biology lab during the summer and fall of 2003. This was a fortunate move as we quickly determined that while photographs are useful, having a real pollen grain on a glass covered slide as a reference sample is much more desirable. The reason is that depth (size) and texture can be gleaned from a reference slide and this 3 dimensional interpretation is not possible with a photograph.

Elaine's masters work was focused on pollen analysis using pollen collected directly from plants. The pollen of interest for our project was contained in honey samples. A literature review of the different techniques used for removing, classifying and counting the pollen grains from a honey sample was completed.

The following basic technique was adopted:

• Document collection date & geographic location date for honey sample to correlate with plants in bloom.
• Warm and dilute honey sample
• Centrifuge the sample and pour off the water
• Mount pollen on slide with glycerin and calberla's solution
• Count 3 transects of slide or at least 20 grains
• Identify color using Pantone color chart
• Compare sample to reference sample and/or photo

Initially a centrifuge was used at the U/M, but we later received a used centrifuge from the University to add to our lab equipment.

In addition, the original money budgeted for a microscope of $1000 was not enough to buy a high quality 100X objective (total magnification of 1000X) to get the level and quality of detail we desired. So the budgeted cost of photography equipment was rolled into the microscope budget and the decision was made to develop our own reference slide collection.

Elaine's assistance was invaluable in making these early decisions in equipment procurement and also in the development of the sampling and identification techniques.

The following is a list of the flora sources that were identified as significant sources of honey during the project. Other less significant floral sources were also identified

Significant honey floral sources
Buckthorn
Mustard
Dutch Clover
Basswood
Birdsfoot Trefoil
Locust
Alfalfa
Sweet Clover
Horse Chestnut
Crown Vetch
Fringed Buckwheat
Purple Loosestrife
Goldenrod
Boneset
Red Sumac
Dandelion

Less common honey floral sources

Maple
Raspberry
Foxglove
Apple
St. John’s Wort
Canadian Thistle
Scorpionweed
Red Clover
Knapweed

The following is the list of floral sources collected and made into reference slides.

Reference Slide Collection

Scientific Name Common Name
Acer saccharum sugar maple
Aesculus hippocastanum horsechestnut
Asclepias syriaca milkweed
Aster laevis aster
Aster novae-angeliae aster
Brassica nigra mustard
Brassica rapa field mustard
Centaurea maculosa spotted napweed
Cirsium discolor field thistle
Cirsium vulgare bull thistle
Coronilla varia crown vetch
Epilobium angustifolium fireweed
Epilobium palustre marsh willowherb
Eupatorium perfoliatum bone set
Euphorbia corollata flowering spurge
Euphorbia esula leafy spurge
Euphorbia splendens crown of thorns
Fagopyrum esculentum buckwheat
Fragaria virginiana common strawberry
Fraxinus nigra black ash
Fraxinus pennsylvanica green ash
Gleditschia triacanthos honey locust
Helianthus petiolaris prairie sunflower
Hydrophyllum virginianum virginia waterleaf
Hypericum perforatum St John's wort
Impatiens capensis jewelweed
Kalmia polifolia bog laurel
Lamium maculatum spotted dead nettle
Lespedeza capitata bush clover
Lonicera morrowi honey suckle
Lotus corniculatus birds foot trefoil
Lysimachia ciliate fringed loosestrife
Lysimachia thysiflora tufted loosestrife
Lythrum salicaria purple loosestrife
Malus floribunda Japanese crabapple
Medicago lupulina black medick
Medicago sativa alfalfa
Melilotus alba white sweet clover
Melilotus officinalis sweet clover
Mentha arvensis field mint
Monarda fistulosa beebalm

Nymphaea odorata fragrant water lily
Phacelia franklinii Franklin's Scorpion-Weed
Polygonum cillinode fringed bindweed
Pycanthemum virginianum horse mint
Rhamnus alnifolia alderleaf buckthorn
Rhamnus cathartica buckthorn
Rubus idaeus raspberry
Toxicodendron vernix poison sumac
Robinia pseudoacacia locust
Rubus idaeus raspberry
Rudbeckia lacinata tall coneflower
Sambucus canadensis elderberry
Solidago altissima tall goldenrod
Solidago canadensis Canada goldenrod
Solidago gigantea giant goldenrod
Spiraea alba white meadowsweet
Stellaria crassifolia fleshy starwort
Stellaria media chickweed
Taraxacum officinale dandelion
Thalictrum dioicum meadow rue
Tilia americana basswood
Trifolium hybridum alsike clover
Trifolium pratense red clover
Trifolium repens white clover
Typha latifolia cat-tail
Typha sp. cat tail
Verbena bracteata verbena
Veronicastrum virginianum culver's root
Vicia cracca bird vetch
Vicia villosa winter vetch

The data collected during the project was used to help define the floral source of honey, which was collected and sold under the Ames Farm Single Source Honey label. The project has provided credibility to our claims concerning the floral sources with which we label our honey. Sales of our honey have increased at double digit rates each year and we our recognized in our market as a major premium honey producer in Minnesota.

In addition to being useful for marketing our honey, the pollen analysis provides more insight into the important honey producing plants in our region. This information is useful when locating sites for keeping bee colonies and also making decisions about management practices. Several floral sources were identified as producing nectar which were not considered common knowledge.

I feel that the additional information our products provide on the nectar sources gives the general public a better understanding and appreciation for honey and honeybees. Without the information this project helped create, a consumer might take honey for granted and not consider the implications of the habitat and plant types that honey bees need to produce honey.

During 2004, I spoke at the summer meeting of the Minnesota Honey Producers Association in Walker, Minnesota. The audience was represented by large, commercial honey producers who sell their honey in drums on the open market. Approximately 300 beekeepers attended the summer meeting. They showed interest in the pollen identification techniques and discussed their application in helping segregate different sources of honey which might provide a higher sales

price. The application for contract negotiations was also considered.

I also spoke at an August 2004 Minnesota Hobby Beekeepers Meeting in St. Paul. About 65 people attended the meeting. I reviewed the project and took questions. Several people stopped to talk after the meeting and expressed interest in the techniques. In general, I raised the awareness of adding value to honey products.

During the duration of the project, several media stories concerning my business were published. In each article, mention was made of either the SARE grant or of the pollen identification techniques I am using to add value to my products. The articles include the following and are accessible from our web site http://www.amesfarm.com/news.htm

St. Paul Pioneer Press
Honey Maker Living a Sweet Dream, BY RICHARD CHIN, Sunday, November 14, 2004

City Pages - The News & Arts Weekly of The Twin Cities
The Taste of Here, By Dara Moskowitz
Wednesday, November 03, 2004

Midwest Natural Food Co-ops Mix Newsletter January-February Year: 2004 Issue
It's 10 o'clock. Do You Know Where Your Honey Came From?
By Susan Palmquist Saturday, November 13, 2004

Research

Participation Summary