

Determination of Apple Quality at Alasa Farms' Compared to
Area Farms With Significantly Higher Spray Costs

By

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The Problem

Introduction

The advent of IPM in the late 1970's brought about some drastic changes for the typical apple grower. The standard practice at the time was a scheduled spray program based on days since last spray application. This changed to a spray application on an "as needed" basis, which was determined by scab maturity levels or bug counts in the orchard. Although this system had many merits, some failures did occur during the learning period involved between the time researchers proposed IPM and the time growers adapted it. This led to a slower acceptance of IPM by growers than has been desired by government agencies.

Purpose of the Study

Today there has been a renewed interest from government (The Grower, July 94) agencies in implementing IPM throughout the agricultural industry. Apple growers have done a good job of adopting IPM but have come to a stop at what is perceived to be the lowest amount of spray material that can produce an economically viable crop, based on university research. This study is just one step in finding ways to lower chemical inputs for apple growers to help in producing a crop that meets government mandates and is acceptable to the consumer as well as being economically viable for the grower.

Statement of the Problem

At Alasa Farms, a 50 acre commercial apple farm in Wayne County, NY, where this study was conducted, the spray costs were found to be about \$120 per acre. This is about one half the average for this region as reported by the 1992 Fruit Farm Business Summary from Cornell Extension, a financial study of 22 local fruit farms (DeMaree, et al. 1992). The question is then

asked about the quality differences between a crop produced with one half the costs for chemical inputs and a crop with full costs. To determine this, it is necessary to compare "apples to apples", which was accomplished through this study.

Definition of Terms

Chemical Inputs - chemicals used in producing the apple crop

Fresh Fruit ----- apples used for eating out of hand

IPM (Integrated Pest Management) - a program incorporating cultural and
chemical systems to reduce pest damage

Processing Fruit - apples used for applesauce, pies or juice

Spray Costs ----- the costs of just the chemicals used in producing the
apple crop

Spray Material --- chemicals used in producing the apple crop

Spray Program ---- a system of spraying a crop based on weather and pests

Research Hypothesis

Alasa Farm apples will not be significantly different in quality from average farms in the Alasa Farms local area when comparing pest related defects to apples.

Methods and Procedures

Subjects

Nine different farms were selected from which to collect apple samples, including Alasa Farms. These farms were not randomly selected but rather by sending letters to several growers from Alasa Farms local area, Wayne County, NY, asking if they were willing to participate in this study. A total of 12 growers were asked to participate and 8 agreed. Anonymity was assured to the

growers and their farms. 5 farms are large, comprising 150 acres or more, while 4 farms are small, comprising less than 50 acres. All are family farms, 6 of which are operated by a father and son or sons. 4 are primarily processing fruit growers, while 5 are primarily fresh fruit growers.

Instrumentation

A Cornell developed (Breth, Et. Al.) data collection sheet was used to determine the direct defects on the sample apples. A Cornell developed data analysis system was used in determining sample differences.

Design

The apples from nine farms were compared. Each farm had one to three varieties that were sampled and compared. Data was collected for each variety and statistically analyzed by computer to determine significant differences in quality relating to pest defects between farms.

Procedure

Apples were collected using a Cornell developed collection procedure. Three different varieties, McIntosh, Empire and Ida Red were collected on the farms that produced those varieties. Five trees were randomly selected in each block and 100 apples were then collected from each tree, 50 from the top portion and 50 from the bottom portion. A cylindrical zone was picked starting from the outside and going all the way to the trunk of the tree with all apples in that zone picked until 50 were collected. Each sample was identified by number to identify the farm, tree and whether top or bottom portion (ex. A1t or C5b).

These samples were then looked at by a local private pest consultant, Liz Graeper, to identify the defects on the apples as per the Cornell data collection sheet. The defects looked for are listed on the Cornell data

collection sheet and are ones that are directly related to spray materials and do not include color, size, bruising or stem punctures.

Proposed Data Analysis

The identified defects were entered into a computer to be analyzed by a software package called Statview using an ANOVA analysis. The percent clean fruit was determined for each sample and used as the basis for comparison. Significant differences between apple samples percent clean fruit was then measured within each sampled variety.

Assumptions and Limitations

One of the problems of conducting this type of study is the number of variables in the real world of agriculture. Weather, individual farm environments, farmer's different inputs as well as individual apple tree variations produce too many variables to make a truly scientific study. The best that can be accomplished is an educated try and detailed analysis taking into account the variables that can be controlled. Some of the particular variables that may affect this study are pest pressure, spray schedule, fertilizer, soil type, tree row volume used, weed spray program, thinning method, summer pruning, tree size and market for the fruit.

Conclusions

The findings of this study little difference in percent between the farm samples. The show the results in detail. In followed by the same letter are different at $P=0.05$ using Fisher shows the Mac data, which showed

Farm	Mac's % clean	Mac
F	95.4%	a
A	92.2%	ab
I	91.8%	ab
B	91.4%	ab
C	91.0%	ab
Alasa	90.2%	ab
D	89.8%	abc
Alasa	85.8%	bcd
G	82.4%	cd
E	76.2%	cd

Table 1 - Mac comparison

point to very clean fruit following tables each case, values not significantly PLSD. Table 1 some difference

between the high and the low. Only sample F was significantly higher in lack of defects than the Alasa Farms sample. The Empire samples, table 2, showed

Farm	Emp 's % clean	Empire
F	96.6%	c
B	95.6%	c
Alasa	94.0%	bc
Alasa	93.2%	bc
E	91.8%	bc
D	90.4%	ab
C	89.4%	ab
G	86.6%	a
A	85.6%	a
I	no Empires	

Table 2 - Empire comparison

that Alasa Farms' samples were towards the top and were not significantly different than the top 5 samples. In table 3, we see that there

Farm	Ida's % clean	Ida Red
F	83.6%	a
B	81.6%	a
D	77.0%	a
Alasa	75.0%	a
G	73.8%	a
Alasa	73.6%	a
A	no Ida Reds	
C	no Ida Reds	
E	no Ida Reds	
I	no Ida Reds	

Table 3 - Ida Red comparison

is no significant difference in the Ida Red samples.

Dissemination of Information

As part of the requirements of this study, it is important to take what has been learned and disseminate it to other growers. This is being accomplished in several ways. At Alasa Farms we mail a newsletter to approximately 1000 individuals who participate in our farm events, including pick your own apples. One issue of this newsletter contained a section on our low spray efforts.

On October 2, 1994 a farm tour was given at Alasa Farms entitled Low-Spray Apple and Commercial IPM Orchard Management. This tour was sponsored by NOFA and lasted from 1:30 pm to 5 pm. About 25 people attended and a detailed discussion ensued concerning the IPM grant and the results that had been found up to that time, which included McIntosh data. Liz Graeper, our pest consultant was available for input as was Brian Caldwell, a well known organic apple grower.

I also delivered a lecture about my low-spray experiences on February 22 at the Cornell co-sponsored Farming for the Future Conference in Syracuse. I

was on a panel for a workshop entitled, "Are Fruit and Vegetables Safe to Eat?".

I have mailed copies of my results to the Cornell IPM team as well as the former Farmer to Farmer Apple group, which is still meeting annually at our own expense, and expect to discuss my results with them.

Further Study

The need for future studies would be a 2 year extension of this study to determine the apple quality comparison's over a 3 year period to further rule out year to year crop and quality variances.

Now that it's been determined that in this particular 1994 crop year Alasa Farms apples are not significantly different in quality than eight other grower's apples, there is a need to complete more research. The next step would be to compare individual spray records of all the participating growers in this current study in detail, to find exactly why Alasa Farms spray costs are significantly less. Without this information it is impossible to advise other growers on how they can apply the information learned from this study to their specific situation considering their microclimate and production techniques.

References

1992 Fruit Farm Business Summary
The Grower- July 1994
Cornell IPM Office, Geneva, NY