CULTURAL PRACTICE DECISION MAKING WITH COMPUTERS

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The subject of this presentation is the use of computers to aid in cultural practice decision making. I would like to discuss how inputs can be analyzed with the use of a readily available informational tool (the computer) and a consistent, organized information gathering system.

It is unlikely that we shall see a significant increase in overall yield per acre in the next several years. As a result of increased costs, high interest rates and increased energy costs, a farmer must look to efficiency of operation and maximization of inputs in order to sustain a profitable farm. Each input must be identified and then utilized in it's most productive fashion in order that high efficiency will occur.

A computer is, "a device used for computing; specifically, an electronic machine which by means of stored instructions and information performs rapid, often complex calculations or compiles, correlates and selects data." A decision is the "act of making up ones mind."

It is obvious from these two definitions that a computer will not make a decision for us, but it can compile, organize and analyze information so that we can make a decision. If a computer is to be used to help us in making decisions, what do we need to know to make use of this management tool?

The first question a prospective computer user might ask; what is the scope of the decision to be made? Two examples are, does seed size profile affect planter performance? or, am I purchasing the right seed?

In order to determine if a computer should be used to answer these questions about a decision to be made, one must answer some questions on problem scope or definition. First of all; what inputs are necessary? To follow through with the above stated example of the effect of seed size on planter performance data on the following factors must be accumulated.

1) Size of cut seed
    a) Average size of the lot
    b) Profile of sizes within the lot
2) Planter performance record
    a) Number of seed planted in an area
    b) Placement of seed relative to the desired placement
3) How many pieces of data are necessary for each input in order to be confident in analysis of the data?

After these questions have been answered a second group of questions should be asked to determine if a computer should be utilized.

1) Can I collect enough data to make a valid analysis of the problem?

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2) Do I need a computer to compile, organize or analyze the data or can I do the calculations on a calculator?

3) Can something be done to improve the operation if the data is correct, calculations are accurate and an analysis is made?

Let's presume due to data volume and analytical complexity and need for speed that we have decided a computer is necessary and one of appropriate size for the operation has been acquired to help in making the decision about purchasing the right seed. The following is one approach to utilization of a computer system for making this decision.

Question: Am I purchasing the right potato seed for planting with my planters?

Sub-Questions:

1) Does the size of the seed I purchase affect the seed cutting equipment's ability to cut the correct size of seed?

2) Does the size of the cut seed affect the ability of the planters to plant accurately?

3) Does planter accuracy affect yield or quality of the crop?

In order to perform this exercise, we shall assume that question #3 (Does planter accuracy affect yield or quality of the crop?) has a positive answer; the quality and yield of the crop is affected by planter accuracy.

How is a program developed? The first input that needs to be measured is the size of the seed which is bought from the seed producer (delivered seed). Seed tubers are weighed, grouped into size catagories and a table or graph is made (Table 1 and Fig. 1).

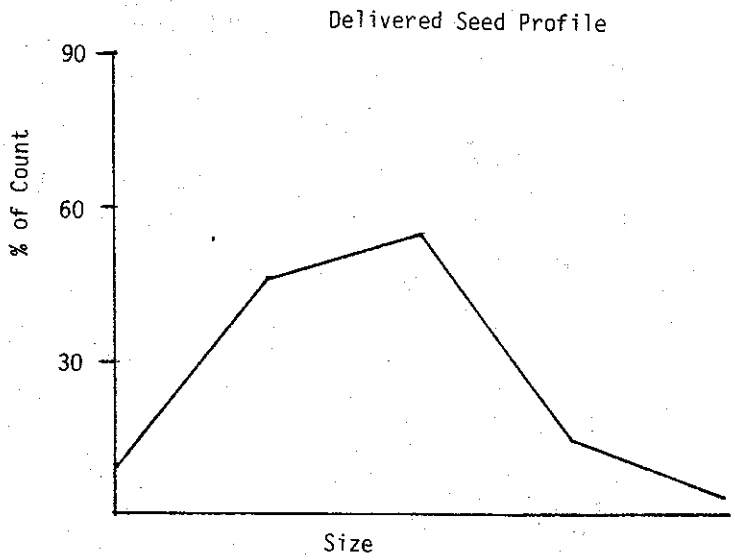
Table 1.

DELIVERED SEED PAYMENT WEIGHT PERCENT

Delivery Date	Below 1 1/2 oz.	1 1/2 - 3 oz.	3 - 6 oz.	6 - 10 oz.	10 - 12 oz.	Above 12 oz.
82-02-25	.90	15.51	62.66	20.91	.00	.00
82-02-26	1.36	22.70	62.26	13.35	.30	.00
82-03-02	2.32	30.52	52.10	13.79	1.25	.00
82-03-03	1.45	25.53	50.79	19.67	2.13	.41
82-03-04	.94	23.44	29.59	38.27	6.64	1.09
82-03-09	.36	20.46	67.28	10.23	.93	.71
82-03-10	3.29	35.45	50.44	8.52	2.28	.00
82-03-11	1.81	18.89	58.99	9.16	9.54	1.57
82-03-12	3.72	24.70	45.84	18.05	5.12	2.53
82-03-13	3.84	25.27	58.87	8.90	2.23	.85
82-03-16	.26	16.80	41.67	31.60	7.05	2.58
82-03-17	.45	36.67	42.81	19.44	.60	.00
Grower Lot Average Weight Percent	1.63	24.35	52.79	17.36	2.97	.87

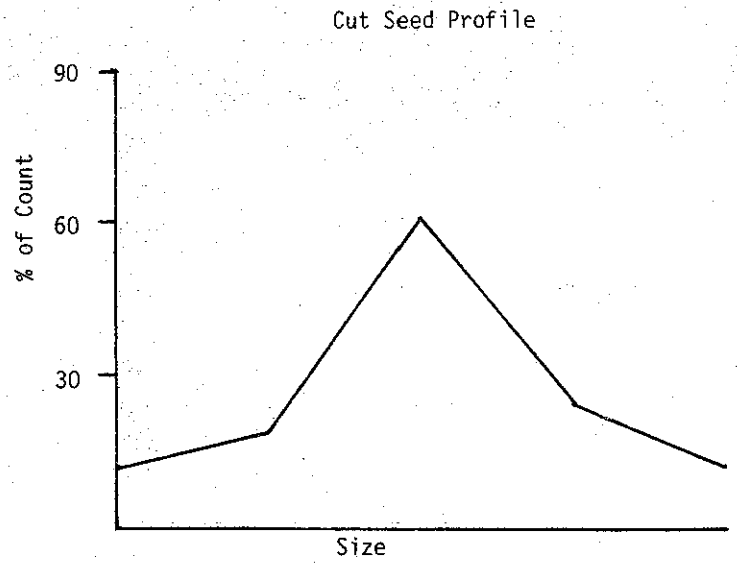
Grower Number - 36

Figure 1.



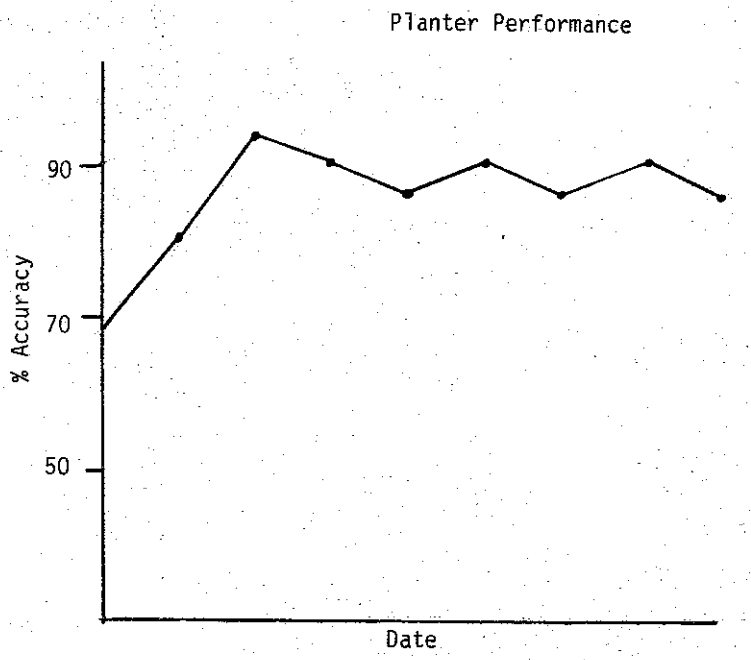
Next a sample of the pieces of tuber cut from the delivered seed are weighed as they came out of the cutters. These data are grouped and a graph (Fig. 2) is made to present the data

Figure 2.



The third input necessary is the placement of the seed in the field by the planter. A standardized area behind the planter is measured and the seed is uncovered. The location of each seed is recorded on a form and the data used to calculate the accuracy of the planter. A graph can be drawn which shows the planters performance over a period of time. (Fig. 3).

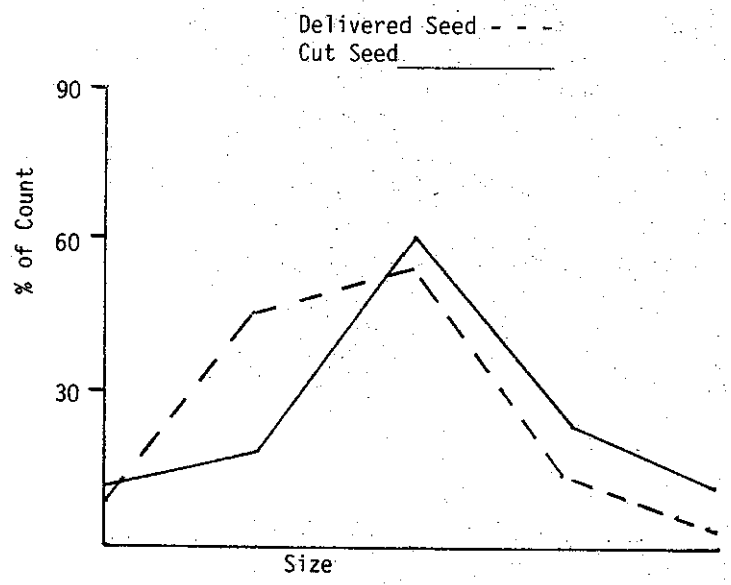
Figure 3.



It is not enough to merely collect the data and to suppose by some magic that the computer knows what to do with it. The computer must be taught what to do (programmed) by a competent computer programmer. This process is absolutely essential and cannot be looked on as secondary. The computer will only do what it is asked to do and can only perform tasks that it is programmed to do.

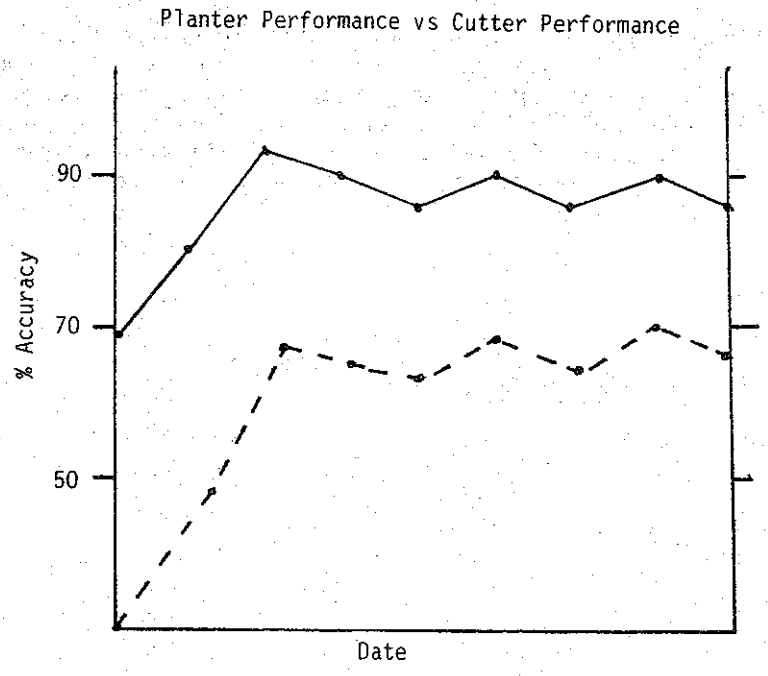
The three sets of inputs can now be correlated (an analysis is made) to determine if any one input has an effect on the other. In this example the graph of the delivered seed profile can be correlated to (overlayed on) the cut seed profile (Fig. 4).

Figure 4.



We can learn from this that as the size profile of the delivered seed changes, the ability of the cutter to perform changes. A comparison of the cut seed profile (standardized for compliance with a desired seed profile) with the planter performance graph can also be made (Fig. 5). This graph can show whether or not the quality of the cut seed can affect the planters performance.

Figure 5.



In regards to making a decision about what can be done to improve the productivity of the operation the following analysis can be performed.

1) The delivered seed size did affect the ability of the cutter to perform. Therefore, I must purchase seed that is sized for my particular cutter.

2) The size profile of the cut seed did affect the accuracy of the planter being used and therefore, I must do a good job of cutting seed.

What do these analysis do for the farmer?

1) Reduced seed losses; the average loss of seed between purchasing and planting is approximately 10%. If the price of seed is $9.00 per cwt. (includes transportation) and 23 cwt/A are planted, the cost of this loss is $20.70 per/A. If the loss can be reduced to 8% by doing a better job of purchasing and, or, cutting, the loss is $16.56 per/A for a savings of $4.14/A.

2) Increased Revenue: Presuming that a more accurate planting job with more uniform sized seed increased yield by 0.5 tons/A and 5% U.S. #1's, the return for the program would be approximately $40/A.

Adding these two benefits together, the dollar return to the grower for a seed program would be approximately $44.14/A.

SUMMARY

Timely and accurate decisions are made through the use of accurate and timely data. If large amounts of data are necessary to achieve the proper samples size or to provide information on several pieces of equipment, a computer may be a necessary tool. The computer is only a tool to help a manager make a decision and will only help if accurate data is input and appropriate analysis are used.

This same procedure may be used in areas of fertility, pesticides, a bruise program, irrigation monitoring, storage monitoring, or any other area of potato production. The computer can also be used for tracking information such as input, price, quantity used and vendor for inventory or financial planning. It appears that the two most crucial questions that are often forgotten are: 1) Can I really make a better decision if I utilize a computer and, 2) Is the value derived greater than the cost of the computer and the necessary programs to support it?