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COMPUTED SCIENCE-TO-ECONOMY CONVERSION FOR BETTER FARMING AND FORESTRY

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Abstract: *Forest farming is a three dimensional farming technique where the synchronization of agriculture and forest environment forms a new kind of self-sustaining ecosystem. This method has various obstacles in form of versatility and ecological balance, which is largely solved by science to economic computation and organized structuring of the farm. The scientific data regarding the farm - the pH value, Rainfall, Humidity, temperatures (day and night) and humus content – is processed to get economic results, which ultimately helps in practical implementation of the method. The main objective is to enhance the practicability of the method.*

Keywords: *science to economy computation, forest farming, economic modeling, computational intelligence.*

I. INTRODUCTION

Forest farming is the method of cultivation of high-value specialty crops under a forest canopy that is maintained to provide shade levels and habitat that favors growth and enhances production levels. [1] Forest farming encompasses a wide range of cultivated systems - from introducing plants into the understory of a timber stand to modifying forest stands to enhance the marketability and sustainable production of existing crops. Non-timber forest products are the biological materials harvested from within and on the edges of natural, manipulated, or disturbed forests. Examples of crops are decorative ferns, shiitake mushrooms, ginseng, and pine straw. [2] Products typically fit into the following categories: edible, medicinal and dietary supplements, floral/decorative, or specialty wood-based products. [3]

The commercial success of the method is very important in making this form of three dimensional farming more versatile. This method can only be spread throughout if and only if it brings considerable commercial success to the farmer.

A. Science-To-Economy Computation

Science to economy Computation is a research discipline at the interface between computer science, pure science and economics. [4] Areas and subjects encompassed include computational modeling of economic systems, whether agent-based, general-equilibrium, macroeconomic, or rational-expectations; through the processing of scientific data.[5] Through a directed algorithm, the economic data can be obtained by the processing of the scientific input taken using computer-based economic modeling for solution of analytically and statistically formulated economic problems. [6]

B. Computation in Forest Farming

The ecological perspective of the forest farming coupled with the need for commercial success question the practicability of the system. The main problems concerning forest farming can be countered by employing science-to-economy computation. The Scientific input being – the pH value, Rainfall, Humidity, temperatures (day and night) and humus content while the economic element being the market value.

C. Algorithm for Science to economy computation of forest farm:

i. Scientific input of a particular crop is taken by the computational tool. The raw data is transferred to the processing block.
ii. The data is processed and the calculated values yield per unit area comes out of the processing block.
iii. The yield per unit area values are multiplied by the economic element – the market value, giving out the revenue per unit area.
iv. Total revenue is calculated by multiplying it with the associated area.

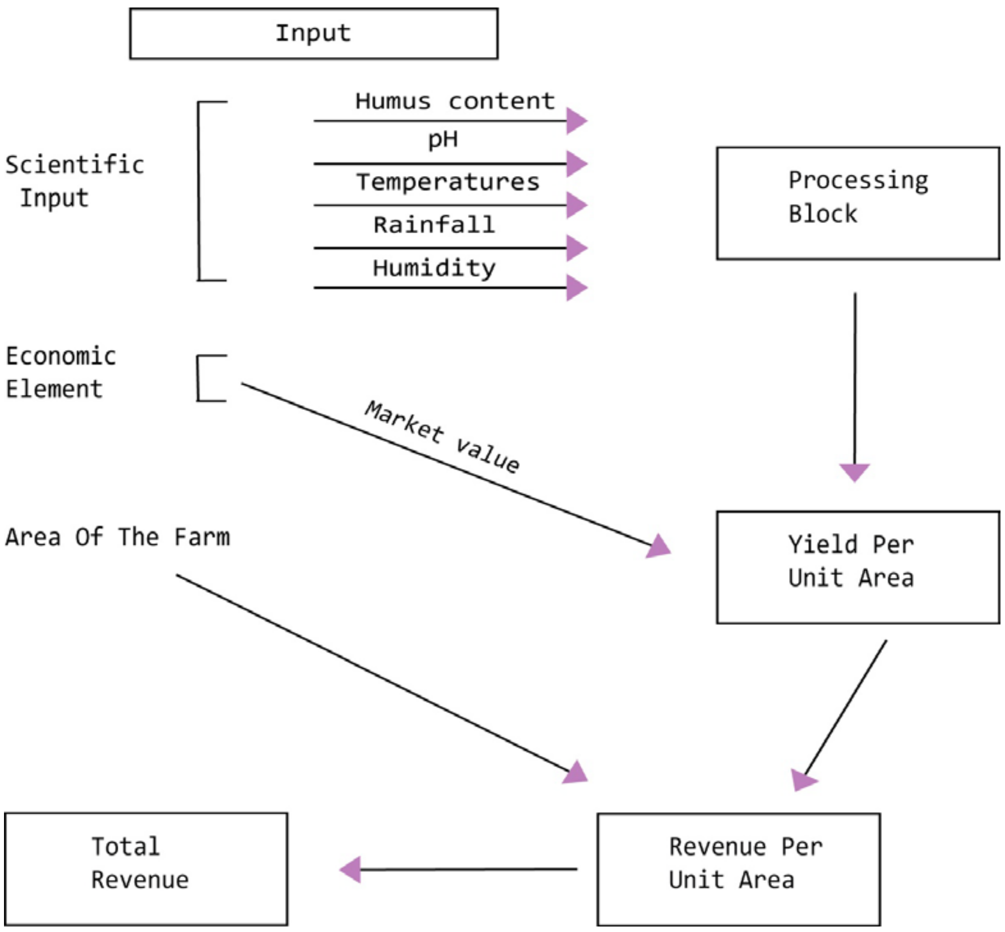

Figure 1: Flow chart of Algorithm

The processing Block:

In the processing block, the relative sensitivity of the crop towards the five scientific parameters along with their ideals values is given numerical representation. For convenience - the sum of the numerical representations of ideal conditions of individual parameter is made 100. For different values of these parameters, numbers are assigned. The database contains raw data regarding the numbers to be assigned for a given value of a parameter as well as the yield per area values for a given sum total.

When the input comes into the processing block, the scientific values are separately compared with values in the database and are assigned a number. After the comparison and number assignment, all these numbers are added up to obtain the sum total. Thus for ideal conditions for a plant, this sum is equal to 100. The resultant sum is again compared to the yield per area values in the database and the calculated value for yield per area comes out the processing block

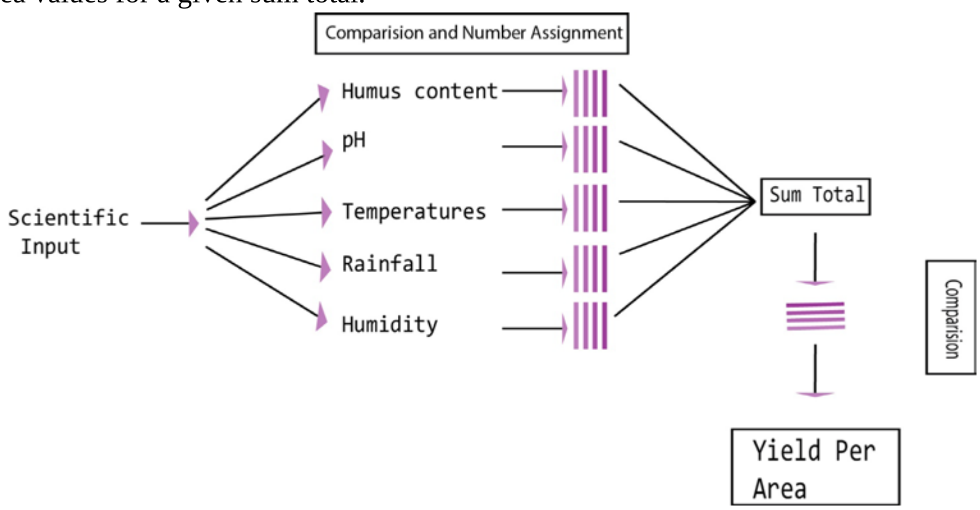

Figure 2: Pictorial Representation of Process Block

II. IMPLEMENTATION

The implementation is done in the form of growth of multiple crops in the same area, computing the results from the observed scientific data and preparation for the yield based on the computed result. The land is distributed among several inter-linked crops which form a loosely bound eco system of their own. This eco system makes the farm self-sustainable, thus not needing Additional man made efforts to maintain the farm. The diversity also helps in financial success and makes it less prone to complete meltdown

The Experiment:

The method is tried in one acre of land in Hassan - Sakaleshpur agricultural region. The observations were carried out with a span of three months from April 2010. The farm includes as many as 12 species of flora divided as follows:

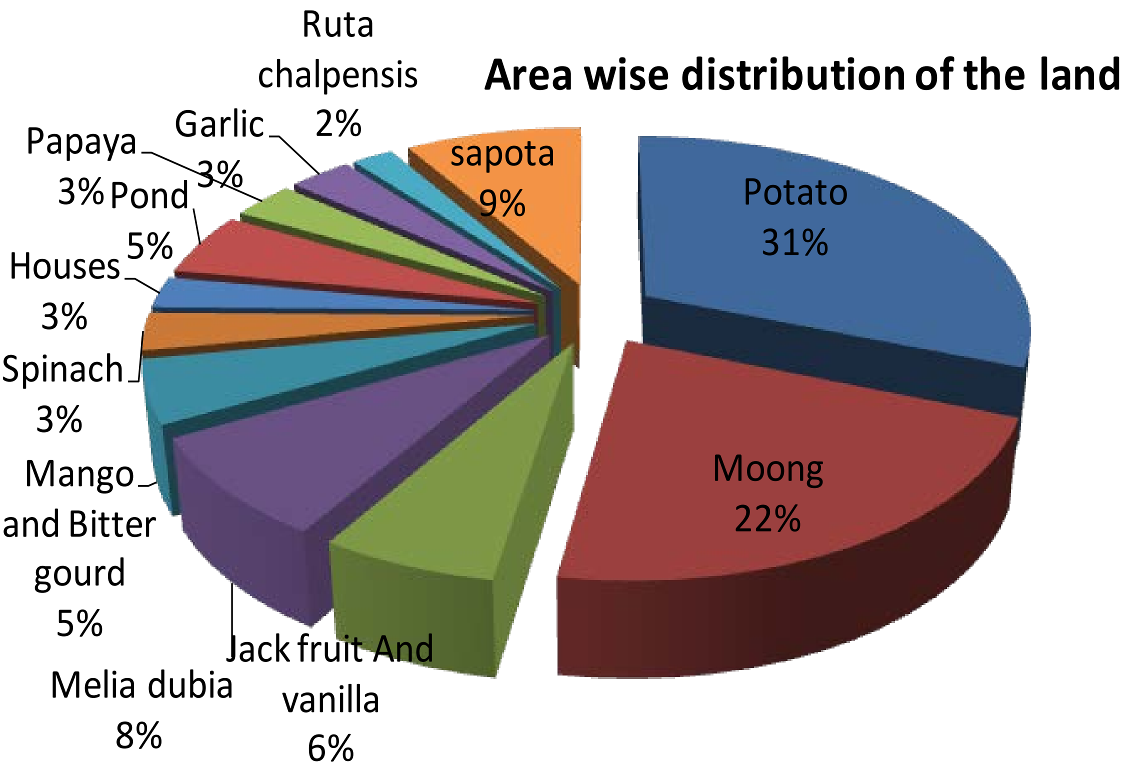

Figure 3: Area wise distribution of land

The prototype computational tool was programmed in C++. Code snippet used for comparison and number assignment-from the prototype without the use of database:

```
Forest f1;

 F1.val_pH=0;
 Cout<<"Enter pH: \n";
 Cin>>float p;
   if(p=<7&&p>6.8)
   {
     F1.val_pH=20;
   }
  else if(p=<6.8&&p>6.3||p=<7.5 &&p >7)
   {
     F1.val_pH=15;
   }
  else if(p=<6.3||p>6||p=<7.8&&p >7.5)
  {
    F1.val_pH=10;
  }
else
 {
   F1.val_pH=0;
 }
```

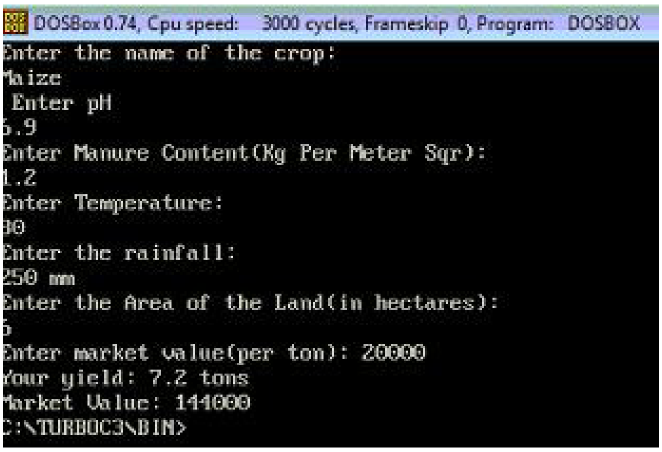

Figure 4: Main Input menu of the computational Tool

III. RESULT

Land Available For Farming– 1 Acre

Crop grown – Paddy

Overview of 2012-2013:

Table 1: Comparison of Forest Faming yield with Organic Farming yield.

YIELD OBTAINED (IN TONS)	MONEY OBTAINED
1.1	46000 ₹
YIELD OBTAINED (IN TONS) Complete Organic Farming	MONEY OBTAINED
0.9	41000 ₹

Table 2: Accuracy in Economic Predictions

CASH PREDICTED	CASH OBTAINED	ACCURACY
50000 ₹	46000 ₹	92%

Table 3: Accuracy in Yield Predictions

YIELD OBTAINED	YEILD PREDICTED	ACCURACY
1.1	1.2	84.4%

IV. CONCLUSION

This method's results have been satisfactory hence it is concluded that it can be practically implemented to a larger area. More importantly, unlike alternative or conventional methods, this eco-friendly farming brings gains to farmer, so it can broadly be executed without troubling the economy; farmers will be more inclined to use this method. Thus it is more practicable form of organic farming and is superior to other methods like mixed cropping. Economic modeling also solves all the related problems such as reaction to crop yield fluctuation; thus creating a whole new field of computational simulations. The synchronization could only work if the conditions were found suitable for the introduced species; this problem is not associated with mixed farming. The interconnection of various species built a new self-sustaining ecosystem, thus fulfilling the basic aim of forest farming. Further research and development encouraged in this domain.

V. REFERENCES

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