



**Efficiency of using Chemical  
Leasing approach in Pest and  
Disease control in Agriculture –  
Evidence from the Potato Cultivation**

Dr HVP Wijewardhana (PhD)

Director

Industrial Development Board of Ceylon

# Business Model - Why

- **Agriculture – Agro chemicals**
  - **One industry highest chemical use 33 bn USD/annum**
  - **Decentralise pollution may health risk –**
    - **CRF?? – Cd from TSP**
- **ChL 4 Agriculture**
  - **Profit making business model**
  - **Low chemical application**
  - **Penetration of ultra modern technologies**
  - **Social acceptability**
  - **Sustainability**

## Business Model – Problems

- **Difficulty of convince the farmer**
- **No vendors ready to be service provider**
  
- **Solution**
- **Service provider - **create artificially****
- **Empower the service provider 4**
- **Out of box thinking**



# Business Model- Approach

- **Crop - Potato (*Solanum tuberosum*)**
- **Location - Nuwara Eliya, Central Province, Sri Lanka at GPS position 6.978412, 80.766634**







Agriculture - ChL

# Business Model – Problems

- **50 days old crop**

- **Pest & Diseases**

- Cut worm
- Bugs - Colorado Beetles
- late blight
- Leaf miner





Agriculture - ChL

# Business Model- Approach



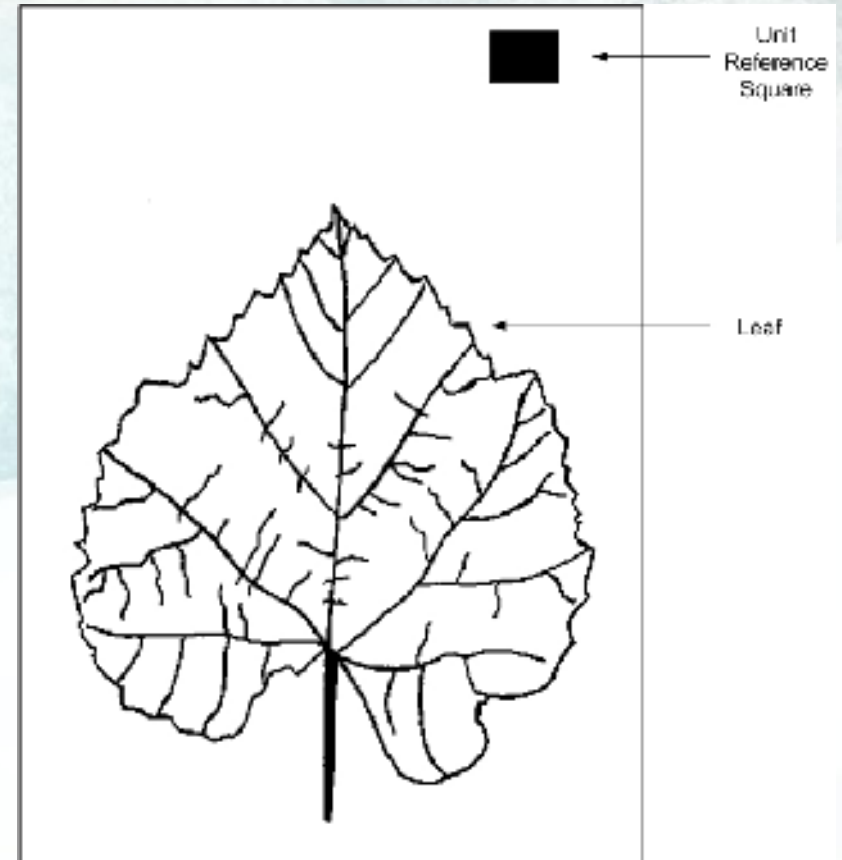
# Business Model- Approach

- The primary purpose is to measure the plant growth through measuring Leaf Area Index (LAI) using a non-destructive method
- All around the world, researchers use very expensive methods
- The conventional methods are very time consuming and error prone
- We use a computer algorithm to do this



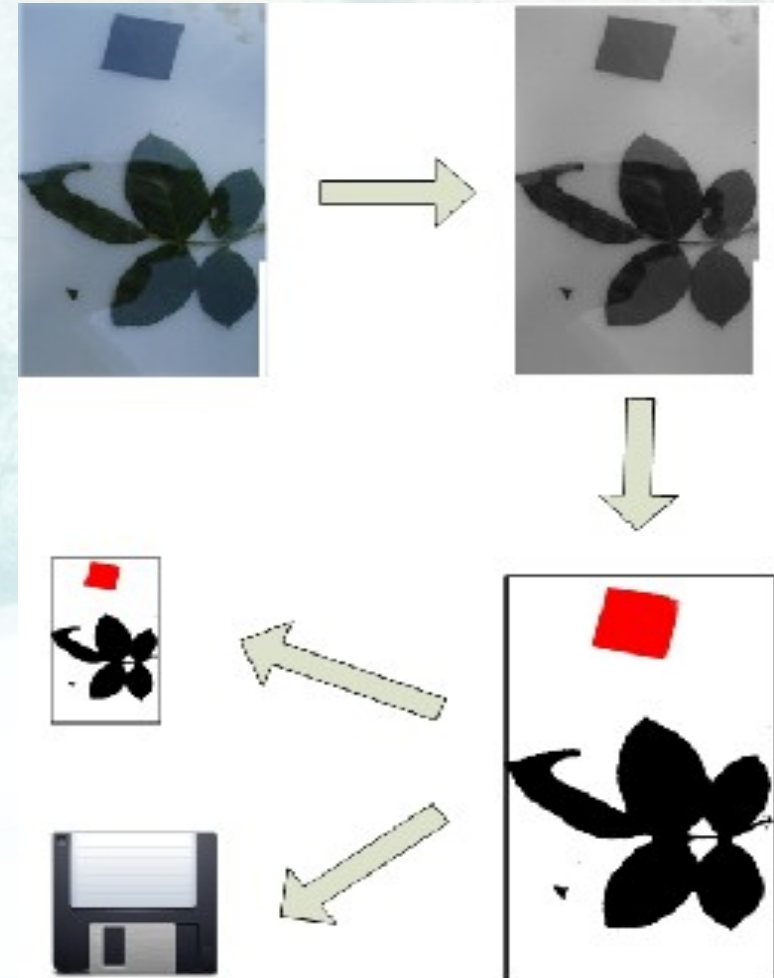
# Features

- C#.net programming language is the development environment using Image Processing approach
- Input: photograph of the leaves or scanned leaf area of the leaf
- A 1cm<sup>2</sup> full black unit is kept in the image/ photo as reference scale of the image



# Logic

- The image is converted to gray scale
- The grayscale image is converted to Black and White (Binary) using Otsu threshold method



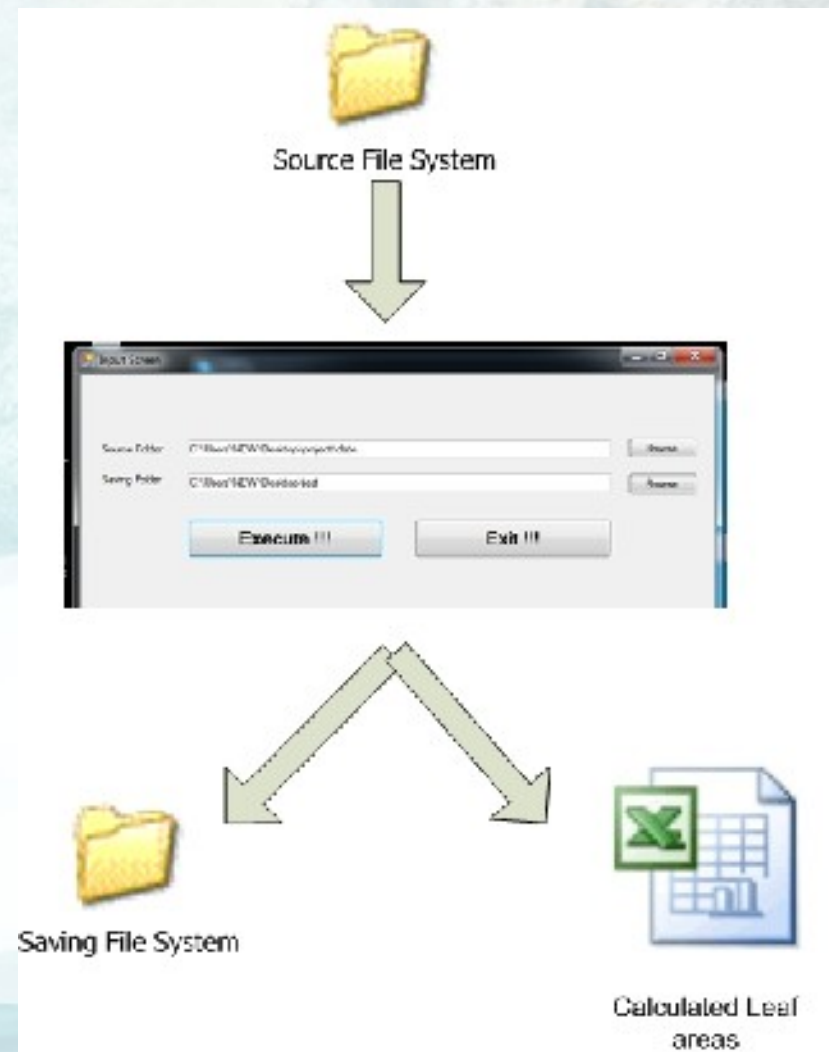
- Detect the unit square

- $\text{Leaf Area} = (\text{Total Pixels} - \text{Unit Pixels}) / \text{Unit Pixels}$   
and calculate leaf area using formula



# Process

- Feed the images to the file system
- Load software and define source path and destination path
- Click execute and do some other path while the software calculates areas
- Save the output results in the required location



# Special Features

- Least expensive and highly economically, socially and operationally feasible for developing countries
- Very high detailed images make very accurate area measurements
- All images are stored in structured file systems in the computer hard disc for future reference
- High performance, automated process



# Business Model – Unit of Payment

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