Utilization of Infrared Warm Imaging for the Fast Analysis of Yield Illness

Abhishek Kumar, Palvadi Srinivas Kumar, Rashmi Agrawal

Abstract: Plants at the very small age suffer from different types of diseases in different seasons. For the better growing of plants needs a special care and attention and need necessary requirement such as water, sunlight and also some pesticides from protecting plants without affecting by any type of insects. Presently there are various testing methods for identifying and safeguarding the plants from different germs. Here we have taken tomato and wheat plants as an example for identifying mechanism. In these two plants we observed that the temperature changes effects as the change in the plant growing method and also observed that rainy season was mostly affected one compared to all for viral infections. For our experiments we have taken the time period for tomato and wheat for taking the disease affected percentage was 5 and 7 days respectively. Our experiments proved that by using the method of Infrared Thermal Imaging and MTD(Modern Tool and Die making Company) mechanisms we can identify the health and condition of the plants by making accurate application and spraying..

Keywords: Imaging, Infrared, MTD, pesticides, sunlight, Thermal.

I. INTRODUCTION

The plants have the different way of growing styles and have sustainability in different seasons and temperatures. Here by not taking all the plants into consideration we are taking the plants of wheat and tomato plants. By taking the plants into consideration we are taking two set of plants. One set is made grown in normal condition and other set is taken in dark room and it is infected with germs and virus and we are testing and making observations from time to time [1].The rest of the article investigates the performance of the software, usability and evolution of the product as well as Thermal imaging camera in our research. At last based on the performances we have presented the results in using this methodology.

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II. LITERATURE REVIEW

A lot of research is going on this domain for the observing and development of plants based on that the analysis the values are recorded.jana waldchen [2] worked on different species of plants with different room and weather conditions and identified the different properties and observed the change them in growth and health of the plant and values are stored in the dataset.Chathura Priyankara [3] has proposed a new method for identifying plants species. He took the different plant leaves and proposed discrimination model for species of the plants and studied classification process. Janawaldchen [4] has proposed a different way for identifying plant species. He used Machine Learning techniques for identifying the type and species of the plant based on the leaves of the plants. University of floral herbarium [5] main intention is to identification of different plant species based on the saving the species of the plants like roots, stems, leaves on the wooden box which is stored in a room temperature for utilizing these resources for future usage. M.J.Dallwitz[6] here they mostly focused on the different keys like conventional keys and interactive keys.in conventional the characters and internal nodes were taken and in interactive method the leaves were gathered and processed. Regarding the study of plants all the scholars focused on potato, brinjal and such plants were taken into observation for the development of the project. here we as per the reviews observations and results we are planning to perform the operations on wheat and tomato plants and the observations are planning to take in two mechanisms by keeping the bacteria in the plants and make the plants into two sections in the first half plants making the plants in sunlight and the rest of the plants make them to grow under the darkness. By doing such methodology different case studies results were formed.

III. METHODS AND TOOLS

The following procedure is followed for collecting and maintaining the plants, fertilizers and bacteria

A. Collection of plants and bacteria separately

Here we are taking the tomato and wheat crops which are purely organic materials and with complete nutrition diet as per Chinese standards used for planting, cropping and maintaining. Here for developing of our project[7] virus was provided by the institute of agricultural sciences and that virus was injected to these crops later these crops were separated from the overall crop and separate them into a fertilized area because not to spread the germs/virus to the healthy plants.

B. Virus gathering

The virus was made grown ,collected with special atmospheric conditions like 12 degrees temperature, 12 hours light density and with 12 hours[8] darkness and followed different features like

- Used filter water.
- Prepared rust with the temperature of 50 degrees.
- Watering and spraying the plants with the above diluted water.
- Covering the plant area with 24 hours with transparent cover.

C. Measuring the effect on plants of tomato and wheat

Different precautions were taken for the development of wheat [9] and tomato plants [10] such as 12 hours of sunlight, 12 hours of darkness, purified water and camera which is rotated for 90 degrees for observing and monitoring of the plants .Here the observed data is stored on the server time to time for checking if anything happens for the plants.

Fig 1: Infrared thermal imagining for thermal acquisition

Here the different temperatures were maintained in different times and the recorded data is stored in High Definition format and the captured images in the size of 480*760 pixels.

D. Effect on tomato and wheat

Here the sample of the leaves and pictures were taken at 3pm every day. The leaves of plants tomato and wheat were taken 24 and 24 respectively [11]. Out of that 12 leaves of tomato and 12 leaves of wheat are taken fresh plants and remaining 12 leaves of wheat and 12 leaves of tomato were collected from infected plants.

These leaves were examined by infrared rays that by Multi Spreader dynamic imagining. Here we take the photos of the leaves in different time periods and by making the background colour as constant. These rays help to scan the leaf and the health condition [12] of the leaves. Here the leaves were kept in the room temperature i.e., at 20 degrees. Here we use a FLIRT tool software for analysing and detecting the health condition of plant and leaves

IV. PROPOSED SYSTEM

This is a newly designed project for checking the quality of plants and generates the report time to time for normal plants like tomato and wheat. We generated results for healthy plants and as well as infected plants.
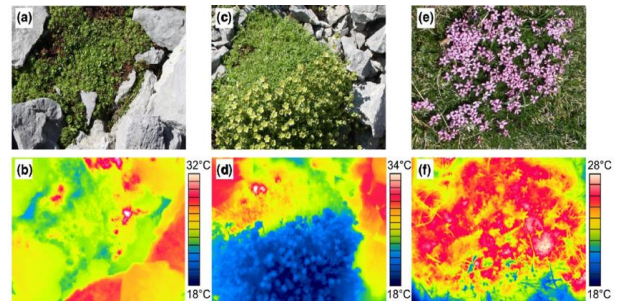

Fig 2: Normal leaves and scanned by Infrared ray leaves here a, c and e is normal leaves and b, d and f are infrared scanned leaves

A. Data Processing and Generation Leaves analyzing

Here in the figure 2 shows the images of actual plants and also scanned pictures of those plants with particular temperature. [13]Here in picture2 plant "A" is captured with the temperature of 32 degrees whereas the resultant picture is "B", picture "C" is captured at 34 degrees whereas the resultant picture is "D", and picture "E" is captured at 28 degrees whereas the resultant picture is "F".
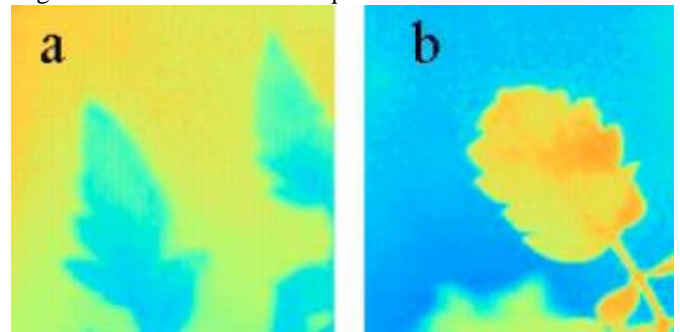

Fig 3: comparison among healthy leaf and virus affected leaf

Here by comparing the figure 3 by passing the infrared rays we can define the quality of the image. Here in figure3 the leaf with green colour[14] is a healthy leaf i.e., "A" in figure 3 and the leaf with yellow colour is an unhealthy leaf i.e., "B" in figure 3.

B. Analysis of Tomato leaves

The analysis of wheat and tomato leaves was taken at different times with different temperatures by making background constant.
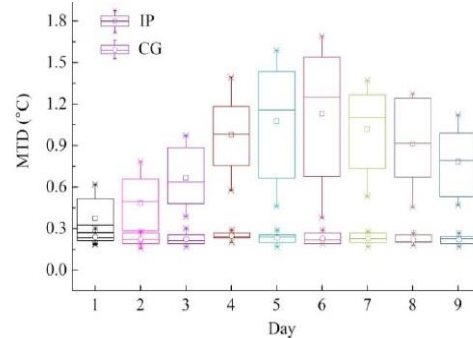

Fig 4: graph representation for change in health of leaves

We have taken the leaves of tomato and tested in infrared rays and in various conditions like heat condition, cold condition, refrigeration condition [15] and plotted the graph based on generated results.

C. Analysis of Wheat leaves

Consider the figure showing the wheat leaves which are healthy and unhealthy conditions and the images were taken in different room conditions [16] by keeping the background as constant. Whatever the precautions followed for tomato is all followed up for wheat plants for growing and for our research purpose.
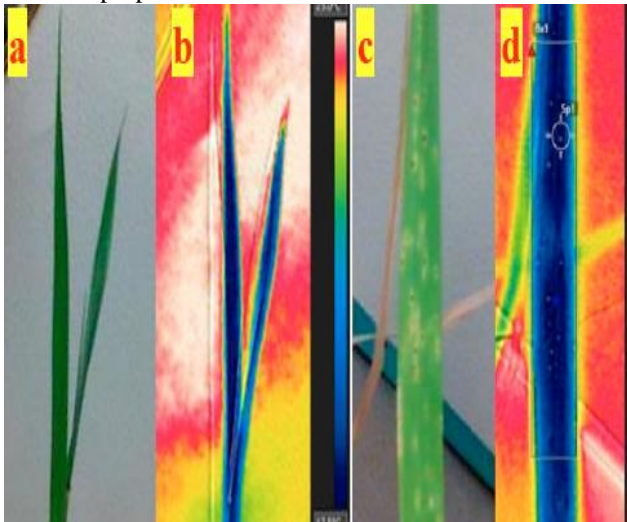

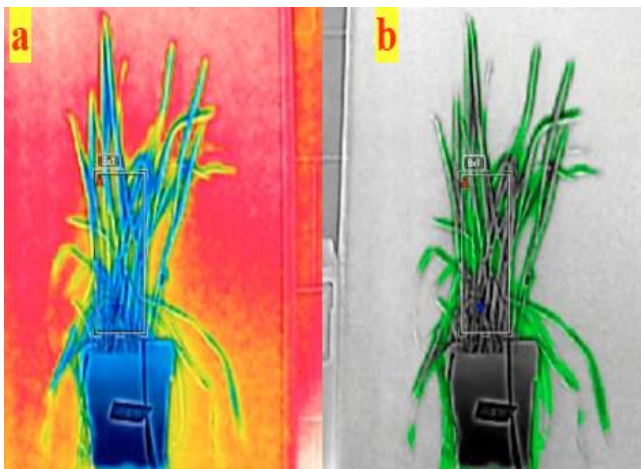**Fig 5: comparison in wheat plants with and without rust**

Figure6: with (A) and without (B) infrared scan
Results

Here as discussed we performed test operations on wheat and tomato plants with different temperatures. Here the overall plant is scanned and pointed out the virus in the plants and generated the statistical reports based on health condition of the plants.
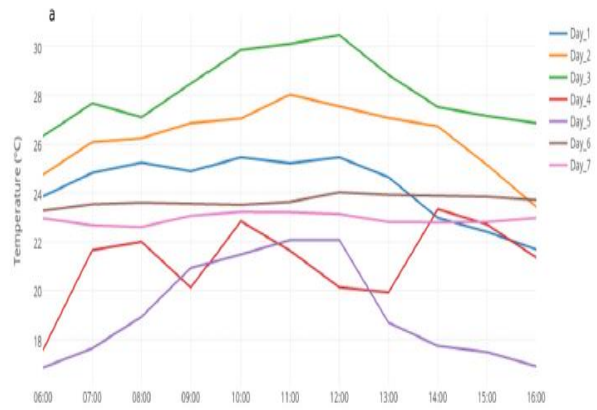

Fig e7: graph showing position of plant in different timings

After injecting the bacteria to wheat plants till 12 days the plant can able to sustain after that it cannot able to survive the germs made the plant weak as the plant getting weak the change in the leaf color started tremendously.ie., from day 13 the position[17] of plants getting weak. Here all the results were examined and values were plotted

Plant	Tomato	Wheat
Target	One leaf	One leaf
MTD range	8 days	10 days
Target(CG)	2 degrees	6 degrees
Target(IP)	0.3 degrees	0.7 degrees
Target(OP)	Unidentified	Identified for different ranges
Total observations	6 days	8 days

able1: comparison among 2 plants in all aspects

V. CONCLUSION

The infrared rays of tomato and wheat plants were considered. The healthy leaves and rusted leaves were considered for infrared for gaining MTD values. The time taken for observations is 6 days and 8 days respectively.

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Abhishek Kumar has done Doctorate in computer science department from University of Madras and research is going on face recognition using IOT concept and done M.Tech in Computer Sci. & Engineering from Government engineering college Ajmer, Rajasthan Technical University, Kota India Jaipur,RTU,Kota he has total Academic teaching experience of more than 8 years with more than 50 publications in reputed, peer reviewed National and International Journals, books & Conferences like Wiley ,Taylor & Francis Springer, Elsevier Science Direct, Inderscience, Annals of Computer Science, Poland, and IEEE. My research area includes- Artificial intelligence, Image processing, Computer Vision, Data Mining, Machine LearningI he has authored 5 books published internationally and edited 8 book with Wiley, IGI GLOBAL Springer, Apple Academic Press and CRC etc.

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Dr Rashmi Agrawal is PhD and UGC-NET qualified with 18+ years of experience in teaching and research. She has authored/coauthored more than 40 research papers in various peer reviewed national/international journals and conferences. She has also edited/authored books with national/international publishers (IGI Global, Apple Academic Press, and CRC Press) and contributed many chapters in books edited by IGI global, Springer, Elsevier and CRC Press. She has also published two patents in renewable energy. Currently she is guiding PhD scholars in Sentiment Analysis, Educational Data Mining, Internet of Things, Brain Computer Interface, Web Service Architecture and Natural language Processing. She is associated with various professional bodies in different capacity, life member of Computer Society of India, ACM CSTA and senior member of Science and Engineering Institute (SCIEI). She is the associate editor of Global Journal on Application of Data Science and Internet of Things. She is also an active reviewer and editorial board member in various journals, achievements, with photo that will be maximum 200-400 words.

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