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Survey on Applications of Image Processing In Agricultural Field

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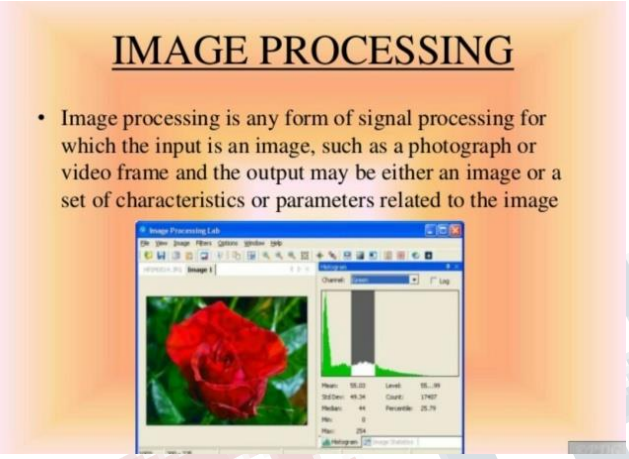
Abstract: **- Mono cropped plantations are unique to India and a handful of countries throughout the globe. Essentially, the FOREST approach of growing coffee along within India has enabled the plantation to fight many outbreaks of pests and diseases. Mono cropped Plantations are under constant threat of pest and disease incidence because it favours the buildup of pest population. To cope with these problems, an automatic pest detection algorithm using image processing techniques in MATLAB has been proposed in this paper. Image acquisition devices are used to acquire images of plantations at regular intervals.Theseimagesarethen subjected to pre-processing, transformation and clustering.**

Key Words- **CCD camera, Trinocular microscope, RGB, EX-C filters, BIAS Software.**

I. INTRODUCTION



Today there are more than 250 organic pesticides and thousands of formulations. The coffee industry unfortunately relies on these poisons to protect he plant and berries from insect attack and disease spread. In some advanced countries aerial spraying of these hazardous chemicals is carried out to save on labor costs. Most, coffee farmers advocate the use of BROADSPECTRUM pesticides. These are more dangerous than system ic pesticides because they acton many insects both beneficial and harmful. There is every chance that these chemicals can easily drift or get washed or leached by heavy showers and reach ground water or open estuaries there by contaminating the earth's precious water reserve. However, the cultivation of these crops for optimum yield and quality produce is highly technical. Alotofre search has been done on greenhouse ago systems and more generally on protected crops to control pest sand diseases by biological means instead of pesticides. Research in agriculture is aimed towards increase of productivity and food quality at reduced expenditure and with increased profit, which has received importance in recent time. A strong demand now exists in many countries for non-chemical control methods for pests or diseases. However no automatic methods are available which precisely and periodically detect the pests on plants. In fact, in production conditions, greenhouse staff periodically observes plant sand search for pests. This manual method is time consuming. With the recent advancement in image processing pattern recognition techniques, it is possible to develop an autonomous system for disease classification of crops. In this paper, we focus on early pest detection. First, this implies to regularly observe the plants. Disease images are acquired using cameras or scanners. Then the acquired image has to be processed to interpret the image contents by image processing methods. The focus of this paper is on the interpretation of image for pest detection.

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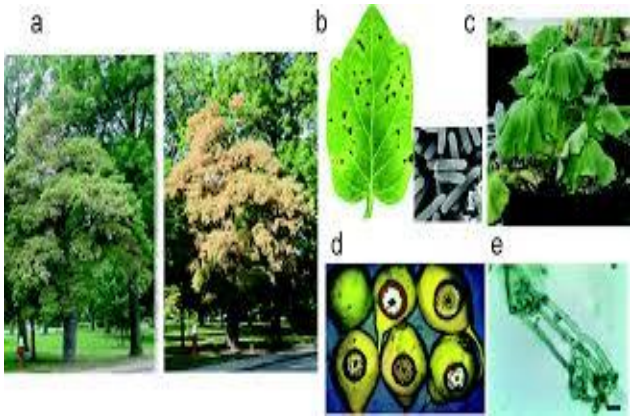

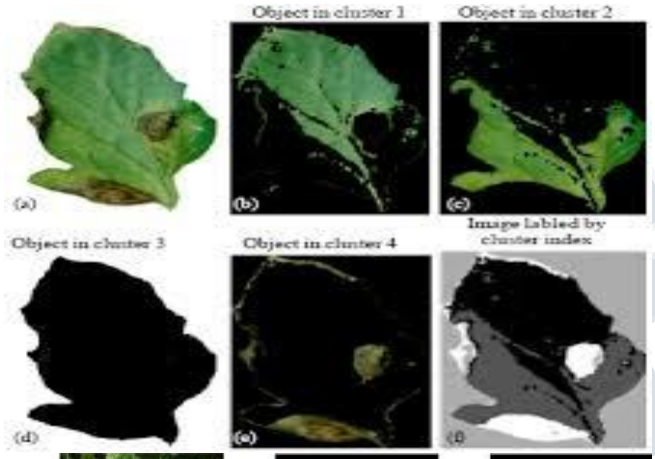

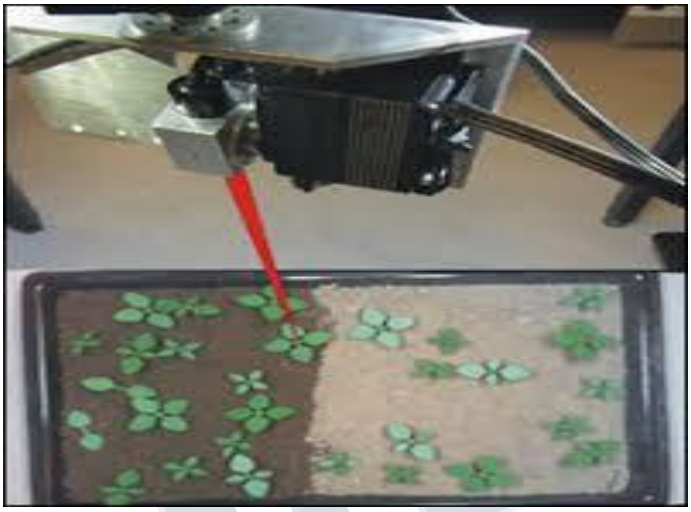

II. WEED DETECTION

Weeds were the plants growing in wrong place in farm which compete with crop for water, light, nutrient sand space, causing reduction in yield and effective use of machinery. Weed control was important from agriculture point of view, so many researchers developed various methods based on image processing. Weed detection techniques used algorithms based on edge detection, color detection, classification based on wavelets, fuzzy etc. Real time weed recognition system for identifying outdoor plant using machine vision uses edge based classifier to identify broad and narrow weeds.[8] Images acquired in RGB were converted to gray scale sand used to process as binary image. Bright pixels in dark background were identified as Weed and classified as in broad and narrow using threshold values. The limitation that proposed model does not classify mixed weeds. In color detection method images were captured adjusting color gain sand shutter time to gray plates. [9] Excessive green and thresholding was used for segmenting volunteer and nonolunteer potato plant regions. Image was then transformed using EGRBI matrix to separate intensity information.EG and RB values help to separate potato pixels from sugar beet pixels. Pixel classification based on K-means clustering and Bayes classifier was used to measure the Euclidean distance. ART2classifierwasalsotestedfor Euclidean distance based clustering. Objects classified on threshold value were identified as potato plants VP and sugar beet SB. Neural network based classification has proven better than K- mean Look up table approach in classification of objects whereas lookup table was four time faster than NN. For

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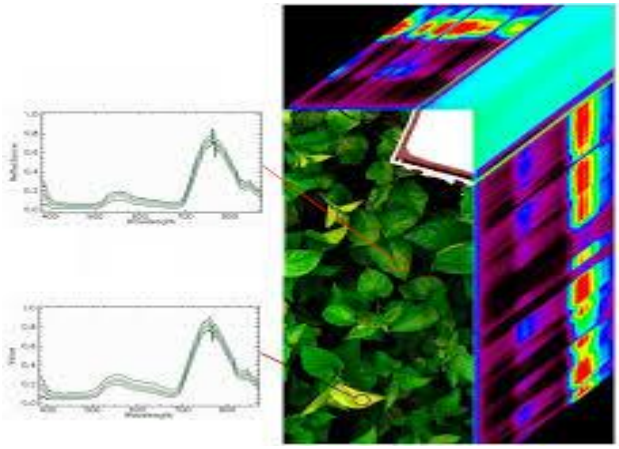
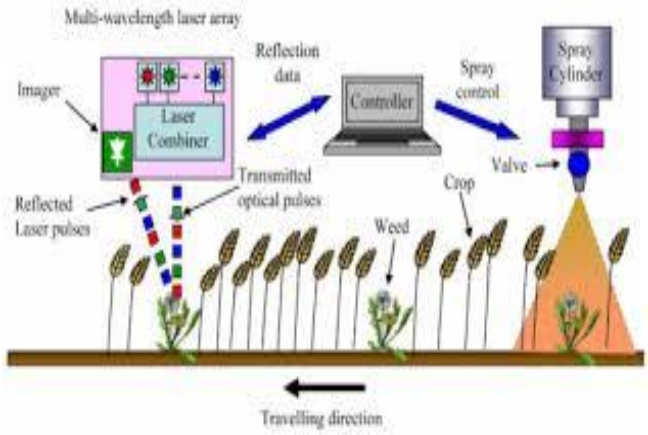
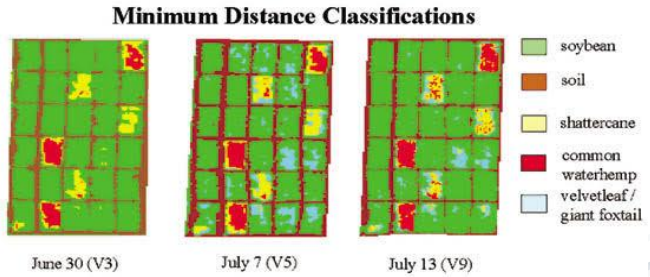


Outdoor conditions plant growth and lighting conditions need to considered and adaptive methods required for classification in such conditions. Statistical methods such as mean and standard deviation were used for image classification of weeds into little, narrow and broad weeds. [11] But the limitation of method was that it cannot be applied for classification of mixed weed. Classification success rate of statistical method was less compared to color method with classifiers.

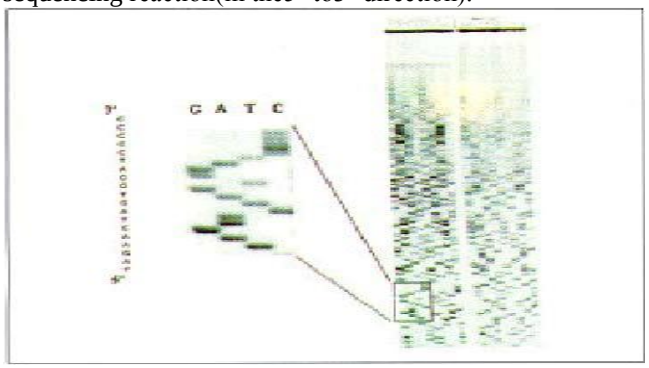
Feature extraction techniques using color image processing for weed detection with FFT and GLCM were discussed.[10] Excess color Ex-C filter was used to remove the color red and blue with green as an intensity value. Ex-C was implemented using formula 2*G-R-B. Gray level co-occurrence matrix and FFT were used as feature extraction tools. GLCM represents the occurrence of gray levels in an image and its relationship in co-occurrence matrix.





III. SOFTWARE FOR AUTOMATED READING OF DNA SEQUENCING AUTO RADIOGRAPHS

DNA sequencing, the method of determining the order of occurrence of nucleotides in a DNA molecule is commonly performed either by the chain termination method or by the chemical Degradation method. Figure2showsan example of a DNA sequencing auto radio graph and the sequence as determined from it. The sequence is read from the bottom to the top by representing each band in the respective lane (labeled G,A, T and C)by that particular base and the order of occurrence of these bases in all the four lanes together represents the DNA sequence of the template used in the sequencing reaction(in the5' to3' direction).



Reading the sequence from the auto- radiographs is one of the tedious steps in large-scale manual DNA sequencing. This step may also contribute to some errors in the sequence output. Windows based software has been developed in

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Electronics Systems Division as well as in Computer Division that enables the user to generate the DNA sequence from digitized auto radiographs. These programs accept in put images in a TIFF format (Tagged Image File Format) which in turn are generated by scanning the autoradiographs on a flatbed scanner. The user has to select the lanes and label the mas G,A, Tor C and detect the peaks in each lane. The program then generates the DNA sequence from the four of the selected lanes in ASCII text format and stores in a file.

IV. MULTISPECTRAL MONITORING,A USEFUL TECHNIQUE FOR AGRICULTURE

Multi spectral monitoring is used for analysis of the physiological status of crops in remote sensing. These operations can be simulated with the use of CCD camera and band pass filters. The digital images of the leaves are grabbed with various band pass filter sand the reflectance is measured using the BIAS software (Fig.3).

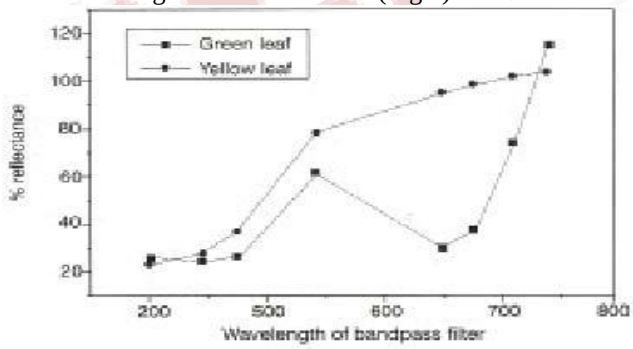

Figure : 3 Reflectance percentage of green and yellow leaves with respect to the background at different wavelengths

If the leaves are healthy they absorb more light in red region and also reflect more in near infrared region. BIAS software offers a facility for pixel to pixel subtraction of the images. If the image taken with red filter is subtracted from the image taken with near infrared filter, the healthy leaves will appear brighter due to large differences in reflectance. Since the unhealthy leaves reflect considerable light in both red and near infrared regions, their image will be darker after subtraction. Thus, multispectral imaging can help to monitor the physiological status of crops in fields and will, therefore, be very useful in agriculture

V. IMAGE HISTOGRAM ANALYSIS

The use of image histogram can reflect the direct effect caused by the illumination where the contrastisafeatureforgreennessidentificationasreportedbyRo meoetal. (2013).They designed a system based on histogram analysis of images with decision-making module determining sufficient greenness. Other work on yellow-skin potato defect detection was presented by Jinetal. (2009) which observed that the majority of defects lies through dark or black spots with low proportion and no signify cant peak in gray level histogram, see Figure1. In continuing image enhancement procedure, Wuetal. (2013) analyzed image histogram and noticed the gray rate in the enhanced image. This helped in deriving appropriate enhancement algorithm for foreign fiber detection in cotton products.

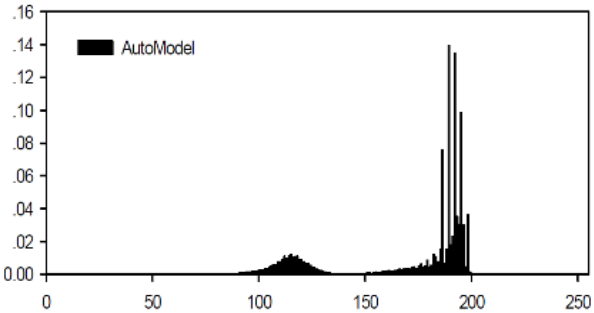

Fig.1 The results Jinet al.(2009)with labeled defects and the corresponding histogram.

VI. CONCLUSION

We have attempted to extend image processing and analysis technology to a broad spectrum of problems in biology. A software CytoPro has also been developed for chromosome analysis, which can quantify the micro-scopic images of cells and chromosomes with the help of a CCD camera mounted on the camera port of a trinocular microscope. All the applications mentioned in this article are described in details in Lecture notes for DAE-BRNS Workshop, 1998.Someof the software programs for image processing and analysis described above are now available in the market and a question is generally asked as why should one try to develop Indigenous systems. The computer based image processing is undergoing rapid evolution in parallel with computing systems. The dedicated imaging systems available in the market, where user can press a few key sand get the results, are not very versatile and more importantly, they have a very high price tag on them. Additionally, it is hard to discern as to how the results are being produced. The open ended imaging systems in BARC are mainly meant for those scientists who i)care to follow ho their image data is processed before producing the final results, ii) want to upgrade and innovate their systems with changing times, and also iii) want to search new frontiers in their fields for applications of this technology

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