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A Survey of Identification of Soybean Crop Diseases

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Abstract— *In this survey ,we are trying to get a detailed survey of soybean crop and its diseases which are affecting the agriculture of world in a large amount and after collecting all the details we are trying to identify crop diseases by taking its samples and train a neural network to protect the crop from diseases by applying some sequential approach.*

Key Words— *Soybean crop samples, Neural Network*, *Clustering,etc.*

I. INTRODUCTION

The Southern Soybean Disease Workers (SSDW) is an organization of pathologists, hematologists, extension scientists, industry personnel, and private consultants involved with soybean production and research in the southern United States. These states include Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Missouri, Arkansas, Louisiana, Texas, and Oklahoma. Soybeans continue to occupy large acreages of land in the southern United States. Soybean acreage for 1987 was 19,000,000 acres. However soybean production has its problems, the most serious being diseases. Recognition and control of these diseases is vital. In 1987, the average loss from all pathogens was 12.8 percent, or 75.3 million bushels. At the average price of $5.50 per bushel, this equals a 414.3 million dollar loss.

II.SOYBEAN CROP AND ITS IMPLEMENTATION

Management of soybean diseases is based upon prevention. The following are some disease management suggestions that should be considered. Since management strategies vary from location to location, a local specialist should be consulted for specific strategies, and for cultivar and pesticide recommendations.

- **Plant high quality, preferably certified seed**. High quality, certified seed reduces the possibility of introducing pathogens into a field, and also produces vigorous seedlings that sustain less seed decay and seedling disease.

-**Apply fungicide seed treatment.** Fungicide seed treatments protect seed and seedlings from seed-borne and soil-borne pathogens. Seed treatments are inexpensive and effective.

-**Use proper seed bed preparation, planting depth, and seeding rates.** This will promote rapid seedling emergence

and vigorous seedling growth, and help the seedling escape seed decay and seedling disease.

- **Practice crop rotation with non-legume crops.** Many pathogens survive between cropping seasons on crop debris. Continuous culture allows the pathogens to perpetuate and multiply. Rotation will reduce the survival and increase of pathogens within the field.

-**Use deep plowing to bury plant debris.** Pathogens survive between planting seasons on plant debris. Deep plowing will physically remove debris from the plant and also hastens decay. As the debris decays, the pathogens will die out.

-**Plant disease resistant cultivars.** Plant resistance is the most efficient and least expensive management practice. However, resistance to all known diseases is not available, and resistance may not last forever. Pathogens sometimes develop new races which overcome plant resistance.

-**Apply nematicides.** Although several effective nematicides are available for soybeans, their cost often makes them prohibitive. Apply at proper rates and follow label instructions.

-**Use foliar fungicides.** When disease pressure is high, fungicides are effective and profitable. Benefits include increased yield and improved seed quality. Apply at proper times and rates following label instructions.

-**Practice good management.** This includes good drainage, fertilization, irrigation, weed control, and insect management. This encourages healthy, vigorous growth that enables the plant to escape disease and be more tolerant to pathogens.

- Disease management is best accomplished using an integrated approach. This requires incorporating as many of the principles listed above that apply.

III.SOYABEAN CROP DISEASES

1.Brown Spot *(Septoria glycines)* :- Brown spot is a common disease which occurs frequently on young plants. If warm moist weather conditions continue, infection, and defoliation

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progress from lower to upper leaves. Usually the hot dry weather of midseason arrests disease development, but the disease may become active again near maturity. If conditions favorable for disease development continue into the season or reoccur before maturity, the resulting defoliation can cause serious yield reductions. The pathogen overwinters on infected leaf and stem debris, and the disease is most severe when soybeans are grown continuously in the same field. Cotyledons, primary leaves, and lower trifoliolate leaves typically show brown spot symptoms. The brown to red lesions vary in size from pinpoint to 4mm wide, but may coalesce and form larger irregular shaped spots .

Fig. Brown Spot Fig. Downy Mildew

Downy mildew, one of the most common foliar diseases of soybean, occurs worldwide, but is seldom a serious problem. This disease reduces seed quality and seed size. if extensive defoliation occurs, yields can also be reduced. Disease development is favored by high humidity and cool temperatures. Symptoms are found on young plants, but the disease does not become widespread in a field until the late vegetative or early reproductive stages. The increased resistance of older leaves and higher temperatures at mid-season stops disease development before extensive damage occurs.

Fig. Powdery Mildew Fig. Aerial Blight

Fig .Frogeye Leaf Spot Fig. Cercospora leaf

Soybean mosaic is caused by soybean mosaic virus (SMV) and is the most widely distributed virus diseases of soybeans. it is spread by planting diseased seed and by at least 31 species of aphids. Symptoms of SMV vary depending on the soybean cultivar, the age of the soybeans, the virus strain, and the temperature. Symptoms are most noticeable under cool temperatures of 18 to 24C. When temperatures rise above 30C., leaf symptoms may be masked. The youngest and most rapidly growing leaves show the most severe symptoms.

The leaves of SMV infected plants are distorted and narrower than normal, and develop dark green swellings along the veins (Fig. 24). Infected leaflets are puckered and curl down at the margin. Plants infected early in the season are stunted, with shortened petioles and internodes.Diseased seed pods are often smaller, flattened, less pubescence, and curved more acutely than pods of healthy plants. Infected seed are mottled brown or black, usually smaller than seeds from healthy plants.

First, it uses advanced computer, database and network technology to automate experimental field data collection, processing and centralization storage processes, thus relieving research staff from tedious and redundant work while also reducing the likelihood of human error during the data collection and transcription processes. Second, it tracks soybean disease infection patterns under different management, environmental and soil conditions during the growing season in Nebraska. Third, it produces an online graphical visualization system based on the near realtime data collected from the experimental field to simulate, monitor and predict soybean disease infection patterns. These graphical representations of patterns are intended to help convey disease infection related concepts and disease control decision-making information to agriculturalists. The online tracking system is designed to help Nebraska farmers to make the right decisions on their daily agricultural practices, such as choosing the right planting date and applying the right pesticide to minimize plant damage and maximize yield potential.

IV. LITERATURE SURVEY

The aim of KMSCD is to provide a knowledge management tool for efficient knowledge acquisition, storage, knowledge engineering, processing and proper maintenance of knowledge that can be ultimately used by the diagnostic expert system. The development of the KMSCD simplifies the complete process of knowledge management by providing user-friendly interface to the domain expert for entering and storing the domain specific knowledge to solve the disease identification

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and control problem particularly for oil seeds crops. The system presently applies to the knowledge management of 25 prevalent diseases of three major oil seeds crops of India viz. soybean, ground nut and rapeseed mustard. The adopted development methodology and the experience acquired in the knowledge engineering and development of knowledge management system for crop disease are discussed in this paper. [1] This paper measured hyper spectral data and Synchronization biochemical parameters of the crops under natural environment contamination in different levels. Three indices including NDVI, TVVMSA VI and MCARIIMSA VI, which were sensitive to crop growth circumstance, became importation parameters, with crop contamination stress level as output, in the process of analyzing crop contamination stress sensibility. And the dynamic fuzzy neural network model was built. The results indicated that the crops heavy Metal contamination stress level could be estimated accurately by using hyper spectral remote sensing method.[1].

After carrying out contrast experiment of acoustic emission on the health crop and disease stressed crop, comprehensively analyzing the relationship between crop disease conditions and acoustic emission signals, and combining the knowledge of plant physiology, we can draw the following conclusions:

(1) There are a certain physiological cycle laws in the acoustic emission of the healthy crop, generally the "double peak area" can appear; and three is a good consistency between its acoustic emission signal strength and acoustic emission frequency, but three are also hysteresis phenomena taking place.

(2) The acoustic emission conditions of crop at the initial stage of disease stress are basically the same as that of the healthy crop, but the acoustic emission frequency can suddenly surge at some time later. The crop begins to appear symptoms of disease at then following time, and the acoustic emission also gradually becomes out of regularity.

(3) Taking acoustic emission (AE) technology as the theoretical basis, through the analysis on the signals obtained by acoustic emission sensors, to further determine the relationship between acoustic emission signals, disease degrees and physiological states of crops, and by taking these as the basis, to investigate diseases forecasting and automatic spraying of agricultural pesticide variables of main crops, it will become a new approach for the physiological signal detection of crops as well as comprehensive and precise prevention and cure of diseases.[2]. In this paper, the data acquisition system and the upper machine software are used to get and analyze acoustic emission signals from tomatoes plant with disease and water stress. Through statistical analysis of acoustic emission signals parameters, we proposed a mathematical model and proved its rationality. Considering the influence of noise, ultrasonic acoustic emission signals is concerned and the model is used to extract high-frequency signals. It can provide reference for irrigation control or acoustic source location.

Canopy reflectance of soybeans measured with a narrowband spectrometer was able to detect differences between healthy and sclerotinia stem rot damaged plants. This was made possible one month before harvest. These results were consistent over two field trials (2000–2001). Mean reflectance in the broadband region, but more specifically in the red narrowband, contributed the most to soybean plant damage estimation. These results are in accordance with earlier findings on the assessment of foliage damage in forestry [8]. However, our results are slightly different from an earlier finding, where it was reported that sclerotinia stem rot damage in soybeans was associated with reflectance at 706 and 760 nm [3].

Plant diseases happen under natural conditions and their symptoms vary significantly under different and in the different stages of disease. Whether the image is segmented correctly or not determines the success or failure of the study. With the use of Otsu leaves are segmented. The white background is more suitable for image segmentation proved by experiments. Because of the variability of lesion symptoms, threshold segmentation is not suitable for use. This paper presents to segment lesion accurately by using Sobel operator to extract lesion edge and operations as region fill, morphology open operation in the H component[4] This paper measured hyper spectral data and synchronization biochemical parameters of the crops under natural environment contamination in different levels. Three indices including NDVI, TVVMSA VI and MCARIIMSA VI, which were sensitive to crop growth circumstance, became importation parameters, with crop contamination stress level as output, in the process of analyzing crop contamination stress sensibility. And the dynamic fuzzy neural network model was built. The results indicated that the crops heavy metal contamination stress level could be estimated accurately by using hyper spectral remote sensing method.[5]

When soybean disease occurs, the main symptoms of the disease are on the leaves, so we can determine types of diseases according to color, size of ill spots and color of attached bacterial spores on the leaves. Now the common early manifestations of soybean diseases described in listed as follows:

1) If light yellow spot and spotted size and white to gray spore then downy mildew;
2) If malacosoma spot and small to large size and black spore then leaf spot;
3) If purple spot and spotted size and light black spore then puerperal;
4)If white to gray spot and spotted to small size and black spore then anthracnose;
5) If white to light green spot and flaky size and asporous spore then albinism;
6) If light brown spot and spotted to small size and black spore then anthrax.

The diagnosis of the crop is to be made with incomplete information mostly. The method to deal with the diagnosis with incomplete information on interval figure is present in the paper. The similarity formulas of the interval figures and the interval sets are given on the concepts of the interval inclusion and the intersection. A soybean disease database model is proposed on interval figure, and the example illustrates soybean diagnosis process in comprehensive. [6] The objective of the present work was to

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evaluate the effects of temperature and leaf wetness in asian soybean (Glycine max L.) rust (Phakopsora pachyrhizi H. Sydow & P. Sydow) intensity in Suprema cultivar and coffee (Coffea arabica L.) rust (Hemileia vastatrix Berkeley & Broome) intensity in Mundo Novo and Catuaí cultivars using linear regression (LR), nonlinear regression (NLR), fuzzy logic systems (LFS) and neuro-fuzzy systems (NFS). Comparing observed and estimated values for both diseases, NFS increased the precision and accuracy of the estimated values, following in decrease order by LFS, NLR and LR. NFS enabled to explain 85% and 99% of asian soybean rust and coffee rust monocyclic process, respectively.[7].

V. CONCLUSIONS

Hence, so many methods had been implemented to control the crops affecting by diseases and after analyzing all the methods we are trying to identify the crop diseases by taking its samples and then train a neural network which will calculate all the results generated by the observation and then detect the affected and non-affected areas in next paper.

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