www.ijecs.in
International Journal Of Engineering And Computer Science ISSN: 2319-7242
Volume 5 Issue 12 Dec. 2016, Page No. 19334-19338

A Review: To Detect and Identify Cotton leaf disease based on pattern recognition technique.

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Abstract: ***India is the country in which most of the people are depend on the agriculture, According to the survey of Government of India Agriculture plays a vital role in the Indian economy. Over 70 per cent of the rural households depend on agriculture as their principal means of livelihood. India ranked in the world's five largest producers of over 80% of agricultural produce items, including many cash crops such as coffee and cotton, in 2010. It has become one of the world's largest suppliers of rice, cotton. Cotton is very important crop in our country and if some disease will affected on that crop the total economy of the farmer as well as country will get collapse. Normally in my country if disease will get detected by the farmer he will contact to the Experienced person and get solution for the same but if the detection and identification of disease not correct will badly affecting on the plant. In second case farmer will contact to the owner of pesticide shop the person will suggest some wrong treatment with respect to his experience. Third case is that farmers are just going with nature they thing is that the disease will get cleared automatically in some period of span. The main motivation of this topic is to identify the type of disease and quantify the damage of crop thereby providing the treatment for the respective disease. This identification and detection of disease is possible by using image processing techniques on the different parts of cotton crop. This review paper will give information about the possible disease on cotton plants as well as possible treatment should provide to the farmer.***

Keywords: Cotton leaf diseases, Active contour model, spatial moment, Central moments, Snake segmentation

I. INTRODUCTION

As we know that cotton is playing important role in the Indian economy, Following are the possible diseases on the cotton as,

1. Alternaria leaf spot
2. Aphids (Cotton aphid)
3. Armyworm
4. Ascochyta blight
5. Bacterial blight/angular leaf spot of cotton
6. Cercospora leaf spot
7. Cotton bollworm
8. Cutworms (Black cutworm)
9. Fusarium wilt

1. Alternaria leaf spot Fig-A FUNGUS

SYMPTOMS
Small, circular brown lesions on cotyledons and seedling leave which expand and develop a concentric pattern; necrotic areas coalesce and often have a purple margin; centers of lesions may dry out and drop form the plant creating a "shot-hole" appearance on the leaves.

COMMENTS
Plants stressed by drought, nutrient deficiency and other pests are more susceptible to the disease; fungus spreads rapidly in dense canopies, especially during periods of summer season, wet weather.

MANAGEMENT
Flow crop residue into the soil at ground to reduce inoculum levels; provide plants with adequate irrigation and nutrients, particularly potassium;.

2. Aphids (Cotton aphid) Fig-B INSECTAphis gossypii

SYMPTOMS
Small soft bodied insects on underside of leaves and/or stems of plant; usually green or yellow in color, but may be pink, red or black and little bit brownish depending on species and host plant; if aphid infestation is heavy it may cause leaves to yellow and/or distorted, necrotic spots on leaves and/or stunted shoots of leaf; aphids secrete a sticky, sugary substance called honeydew which encourages the growth of sooty mold on the plants and causes loss of production.

COMMENTS
Honeydew excreted by aphids promotes growth of mold. This honeydew also attracts ants which then protect the aphids from natural enemies and even move aphids to other parts of the plants and even other plants.

MANAGEMENT
If aphid population is limited to just a few leaves of cotton or shoots then the infestation can be pruned out to provide control; check transplants for aphids before planting of cotton; use tolerant varieties if available; reflective mulches such as silver colored plastic can deter aphids from feeding on cotton

plants; sturdy plants can be sprayed with a strong jet of water to knock aphids from leaves of plant; insecticides are generally only required to treat aphids if the infestation is very high - plants generally tolerate low and medium level infestation of plant; insecticidal soaps or oils such as neem or canola oil are usually the best method of control; always check the labels of the products for specific usage guidelines prior to use.

3. Armyworm Fig-C INSECT

SYMPTOMS
Holes in bracts associated with bolls; heavy feeding by young larvae leads to skeletonized leaves; shallow, dry wounds on fruit which are preliminary term of cotton; egg clusters of 50-150 eggs may be present on the leaves; egg clusters are covered in a whitish scale which gives the cluster a cottony or fuzzy appearance; young larvae are pale green to yellowish in color while older larvae are generally darker green with a dark and light line running along the side of their body and a pink or yellow underside of cover.

COMMENTS
Insect can go through 3–5 generations a year of affection.

A) MANAGEMENT
Organic methods of controlling armyworms include biological control by natural contents enemies which parasitize the larvae and the application of Bacillus thuringiensis naturally; there are chemicals available for commercial control but many that are available for the home garden do not provide adequate control of the larvae.

4. Ascochyta blight Fig-D FUNGUS

SYMPTOMS
Brown or gray spots on leaves surrounded by a red halo; elongated red-purple cankers on stems cause the wilting and death of leaves above parts of plant.

COMMENTS
Disease emergence is favored by cool, wet weather.

MANAGEMENT
No fungicides are currently registered for use in cotton plant; plow crop debris into soil after harvest; crop rotation has little to no effect of control of disease.

5. Bacterial blight/angular leaf spot of cotton Fig-E BACTERIUM

SYMPTOMS
Water-soaked spots on leaves which are delimited by leaf veins of crop, giving them an angular appearance to leaf; lesions increase in size and turn black and necrotic; leaves drop from the plant of cotton; disease may also cause elongated gray-black lesions extending from the leaves of plant to petioles and stem which are known as the "blackarm" phase; severe blackarm symptoms may cause the stem to be girdled of leaf ; water-soaked lesions may be present on bolls; boll lesions enlarge and become sunken and brown-black in color.

COMMENTS
Disease if observed and often introduced to cotton fields by infested seeds.

MANAGEMENT
The use of resistant cotton varieties is the most effective method of controlling the disease on plant; cultural practices such as plowing crop in this residue into soil after harvest can also limit disease emergence effectively.

6. Cercospora leaf spot Fig-F FUNGUS

SYMPTOMS
Circular red lesions on leaves which enlarge and turn white or gray in the center; normally lesions often have a pattern of concentric rings and possess a red margin; dark gray spore masses form in the centers of the lesions making them appear dark gray on leaf.

COMMENTS
Fungus overwinters in crop debris from previous growing season of seeds; commonly found alongside Alternaria leaf spot and other foliar disease on plant.

MANAGEMENT
Normally plow crop residue into the soil to reduce inoculum levels; provide plants with adequate irrigation and nutrients regularly; applications of appropriate foliar fungicides may be required on susceptible cultivars of plant.

7. Cotton bollworm Fig-G INSECT

SYMPTOMS
Holes chewed in bases of bolls and insect frays around holes on leaf ;young caterpillars are cream-white in color with a black head and black hairs are found; older larvae may be yellow-green to almost black in color with fine white lines along their body and black spots at the base of hairs; normally eggs are laid singly on both upper and lower leaf surfaces and are initially creamy white but develop a brown-red ring after 24 hours and darken prior to hatching on plant.

COMMENTS
Normally adult insect is a pale green to tan, medium sized moth; insect is also very damaging pests of corn; insect overwinters as pupae in the soil affected.

MANAGEMENT
Normally management of bollworm monitor plants for eggs and young larvae and also natural enemies that could be damaged by chemicals; Bacillus thuringiensis or Entrust SC may be applied to control insects on organically grown plants of cotton; appropriate chemical treatment may be required for control in commercial plantations on the leaf.

8. Cutworms (Black cutworm, variegated cutworm) Fig-H INSECT

SYMPTOMS
Stems of young seedlings may be severed at soil line respectively on cotton plant; larvae causing the damage are usually active at night basically and hide during the day in the soil at the base of the plants or in plant debris of toppled plant of cotton cultivation; larvae may exhibit a variety of patterns and coloration but will usually curl up into a C-shape when disturbed among plot of plant.

COMMENTS
Insects outbreak favored by a cool, wet spring following a mild winter; cutworms have a wide host range and attack vegetables including as asparagus, bean, cabbage and other crucifers, carrot, celery, corn, lettuce, pea, pepper, potato and tomato mostly.

MANAGEMENT
Remove all plant residue from soil after harvest or minimum at least two weeks before planting, this is especially important if the previous crop was another with some different fertilizers host such as alfalfa, beans or a leguminous cover crop; plastic or foil collars fitted around plant stems to cover the bottom 3-4 inches above the soil line and extending a couple of inches into the soil can prevent larvae severing plants; hand-pick larvae after dark; spread diatomaceous earth around the base of the plants (Normally it creates a sharp barrier that will cut the insects if they try and crawl over it); apply appropriate insecticides to infested areas of garden or field if not growing organically.

9. Fusarium wilt Fig-I FUNGUS

SYMPTOMS
Wilting of cotyledons and seedling leaves; cotyledons become chlorotic at the edges and then necrotic basically; older plants exhibit symptoms of wilting and leaf chlorosis heavely; wilting is usually gradual but may be pronounced after heavy summer rain; if infection is severe plants become stunted and may be killed normally; vascular system of infected plants becomes discolored and can be seen by cutting the stem of plants.

COMMENTS
In This disease emergence of cotton is favored by warm temperatures; fungus may be introduced to field through infected seed or by contaminated equipment and human movement normally.

MANAGEMENT
Use on certified, disease-free seed from trusted sealer; plant varieties with higher resistance to the disease in areas with a history of Fusarium diseases; fumigating the soil may reduce disease incidence of plant.

II. LITERATURE REVIEW

Cotton is a principal cash crop in India and affects India's economy in many ways. Large number of people depends on Cotton crop either by its cultivation or processing. The cotton productivity become more mission oriented in recent times due to increasing domestic and International demand.

The experts usually judge the symptoms with bare eyes. However, this necessitates continuous monitoring by experts which is expensive in case of huge farms. On the other hand farmers judge the symptoms by their experiences, the incorrect identification leads to wrong control measurements, such as excess use of pesticides and at inappropriate time.

Automatic detection of plant diseases is an essential research topic as it may be advantageous in monitoring huge fields of crops, and detect the symptoms of diseases as soon as they appear on plant leaves [1] [2] [3]. Therefore the need for fast, automatic, less expensive and accurate method to detect plant disease cases is of great realistic significance [4] [5].

Nowadays image processing techniques and neural networks are used for implementation of automatic system that can detect the different plant diseases. Such system is useful in monitoring large crop fields as well as for early detection of diseases.

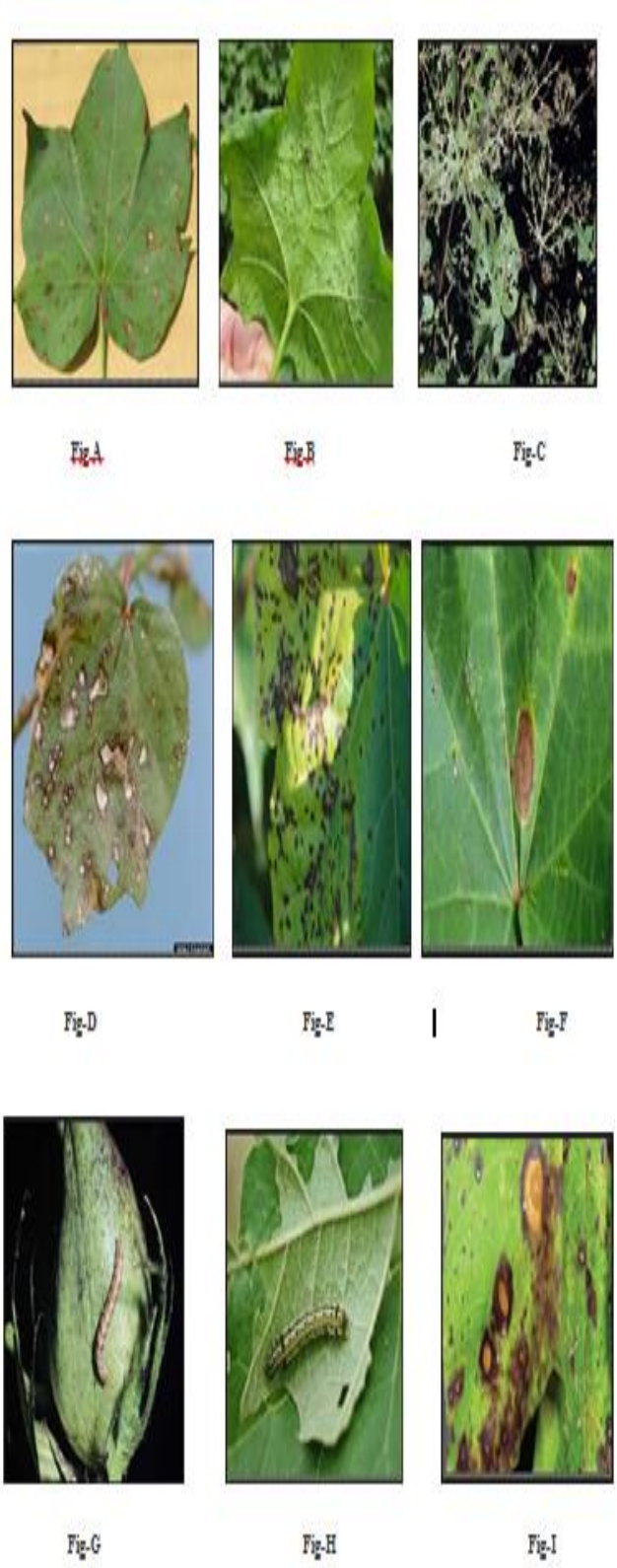
Sanjeev Sannakki et al. [4] proposed a system for two major grape diseases viz. Downy Mildew and Powdery Mildew. The input images are resized to standard size 300×300 and green pixels are masked. Then the images are enhances by five iterations of Anisotropic Diffusion to preserve the information of affected portion.K-mean clustering is used for segmenting and texture features are extracted by calculating the Grey Level Co-occurrence Matrix. Backpropagation neural network is used for classification to obtain the training accuracy of 100%.

Asma Akhtar et al. [5] proposed the system to identify Rose leaf diseases namely Anthracnose and Black Spots. The segmentation is performed using thresholding method and the value of threshold is determined using Otsu's algorithm. Eleven Haralick texture features, DCT features and DWT features are extractd in this experimentation. The use DCT and DWT features with Support Vector Machine as classifier found to give maximum accuracy of 94.45%.

G.Anthonys and N.Wickramarachchi [2] proposed an image recognition system for identification of diseases namely Rice blast, Rice sheath blight and brown spot in paddy fields of Sri

DOI: 10.18535/ijecs/v5i12.11

Lanka. Sobel method is used to detect the edges of the image. Texture, shape and color feature disease spot are extracted which are used for classification. The accuracy of the system was 80% for Rice blast, 60% for Rice sheath blight and 85% for Brown spot



III. Problem Statement of System

To propose a system which will accept images form remote location and to identify whether the cotton leaf is affected with certain disease or not and if it is affected with disease prove solution to the Farmer.

IV. Objective

- To detect leaf disease accurately.
- To provide solution to the farmer in regional language

V. Conclusion

The leaf diseased cotton leaf images are classified using Back propagation neural network where the training is performed by extracting seven invariant moments from three kinds of diseased leaves images. The average accuracy of classification is found to be 85.52%. The snake segmentation algorithm provides efficient technique to isolate the diseased spot but is a very slow process. This results in longer training and testing phase for the system. Various other promising features can be added in feature extraction process for making the system more robust. This may help in increasing the performance of the system. Same work can be carried out for identification of diseases on other crops like Orange, Citrus, Wheat, Corn, Maize, etc.

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