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Detection of Rice Leaf Folder using Black White – Red Green Blue (BW-RGB) Masking and Colour Code Detection

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Abstract: The main objectives of this research is to develop an algorithm and to detect the presence of a Rice Leaf Folder at paddy plants. This paper focuses on the image processing technique to increase the quality of the image to detect the pest. The methodology involves image acquisition, image pre-processing, analysis and detection of pest attacks. There are two methods used namely Black White – Red Green Blue (BW-RGB) Masking and Color Code Detection. The BW-RGB masking detection is the process of taking grayscale image and convert them to black and white images by replacing all pixels in the input image with luminance greater than one (white) while replacing other pixels with value zero (black). The function of BW is to separate an object in the image from the background when it is often produced by threshold, grayscale and colour image. Colour code is a system to display the information by using different colours. The colour code is translated into two conditions; Hexadecimal code and RGB value. The RGB value uses three numbers with a range of 0 to 255. All sample images will be converted into binary data in Graphic User Interface (GUI). This system can be used practically to be further improved in the future. The presence of Rice Leaf Folder is accurately detected by using BW-RGB masking and 33.33% accurate using Colour Code detection.

Keywords: Rice Leaf Folder, Image Processing Technique, BW-RGB Masking Detection, Colour Code Detection

1. Introduction

Oryza Sativa is the scientific name of paddy plant or commonly known as Asian rice [1]. Oryza is classical Latin word for rice and Sativa means "cultivated". The physical of paddy leaf are long, flattened and many parallel veins on upper surface of the leaf. The spikelets are carried on small rachillae at the end of branch of panicle and enclosed by lemma and palea. Paddy plants contain two

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major subspecies which are short grained (Japonica variety) and long grained (Indica rice). The short grained are usually at the area of dry field such as East Asia, Southeast Asia, and South Asia while long grained growth throughout tropical area. The temperature and the rainfall distribution in Malaysia are suitable for cultivation of rice. Paddy is a major source of food for Asian people especially in Malaysia and it is a nutritious food when it taken in middle quantity. The paddy is one of the commodities crops in Malaysia and there is must be some study to be done to ensure this industry will long last with good quality product. Besides commodity crop, paddy is also susceptible to be infected by pest attacks. There are a lot of studies done which related to destroying of paddy. One of the problems faces is pest attacks that bring huge effect to the economics of paddy industry [2].

Rice Leaf Roller is the larva which folds the leaf and crops the green tissue within the drying of the leaf before they feed inside the folded leaf creating longitudinal white dusty and transparent streaks on the leaf. When the larva folding the leaves, the damaged has occurred to the more than half of flag leaf and the next two youngest leaves in each tiller. Rice Leaf Folder occur in all rice environment and more abundance during the rainy seasons because the soil is moist and the weather is cool [3].

2. Methodology

The proposed work aims on detection of the Rice Leaf Folder. The techniques used are image acquisition, image pre-processing, Black White – Red Green Blue (BW-RGB) masking and Colour Code detection. The overall process of the Rice Leaf Folder is shown in Figure 1.

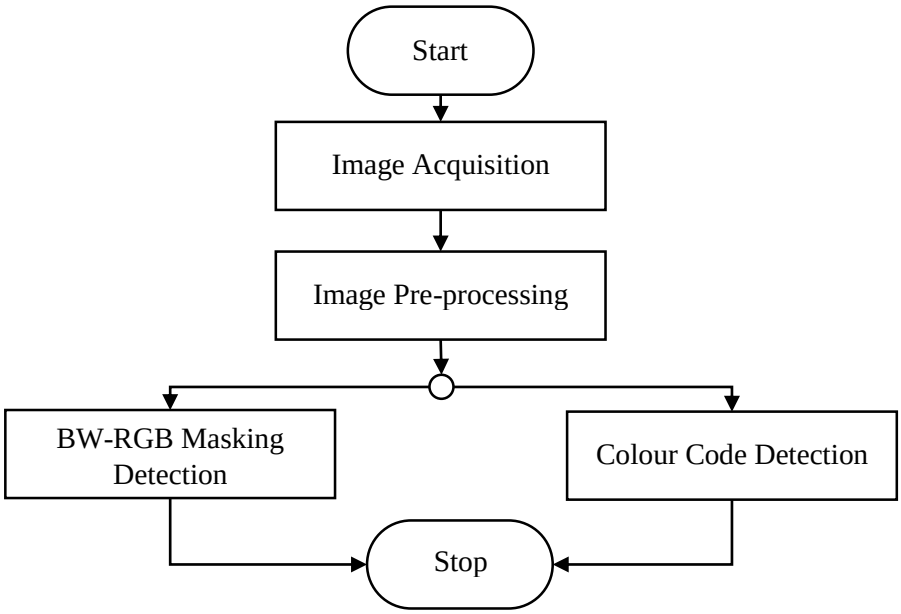


Figure 1: Flowchart to detect Apple Snail Eggs and Rice Leaf Folder on Paddy Leaves

2.1 Image Acquisition

The first step in image processing is image acquisition which is to get the sample or image to analyse the data by using camera [4]. G. Jayanthi describe that an image acquisition is a process that getting an input signal to classify the object by using digital image processing [5]. In this project, the camera which sensitive to visual is uses to detect the pest attacks.

2.2 Image Pre-processing

The image pre-processing includes cropping, resizing and colour conversion. The image obtained are dissimilar in size. Resize the image to uniform 256*256 dimension for efficient processing [6]. During the pre-processing stage, noising, cropping and image enhancement is done to analyse desired

input image for the next step [7]. The more relevant processing is the improvement of data technique that suppress undesired image data deformation or embellish the image characteristics.

2.3 Black White-Red Green Blue (BW-RGB) Masking Detection

Binary image or black-and-white (BW) are consists of the pixel that have two colours such as black and white. BW in Matlab is the process of taking grayscale image and converting to black and white image by replacing all pixels in the input image with luminance greater than one (white) while replacing other pixel with value zero (black). Furthermore, the purpose of BW is to separate an object in the image from background when its often produced by threshold, grayscale and colour image. The colour of object selected is usually in white colour which is referred as foreground colour while the rest which is black colour as a background.

2.4 Colour Code Detection

The colour code can be translated in two condition which are in Hexadecimal code or Decimal Code. The Hexadecimal code is a 6 digit of combination between number, letters and symbol such as #FFC0CB. The first two digit represent red, the middle two represent green and last two represent blue.

3. Results and Discussion

The results are described in two methods of detection which are Black White – Red Green Blue (BW-RGB) Masking and Color Code Detection.

3.1 BW-RGB Masking Detection of Rice Leaf Folder

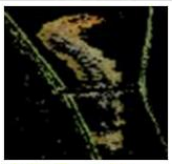
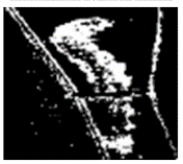
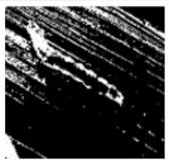
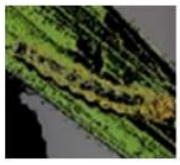
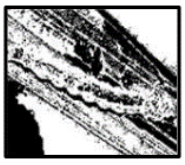
Table 1 shows the range value of RGB and the formula of RGB in createmask based on chosen histogram thresholds for detection of Rice Leaf Folder. The threshold channel 1 based on histogram settings is for value of Red Colour (R). For detection presence of Rice Leaf Folder, the minimum channel value of Red colour is 104 while channel maximum value is 184. Channel 2 is based on histogram and it represent Green colour. The minimum value for Green colour is 87 while its maximum value is 16.1 The Blue colour for channel 3 with the minimum value is 26 and maximum value is 121.

Table 1: The range value RGB for detecting the Rice Leaf Folder using BW-RGB Masking Technique

	Channel 1 (Red)	Channel 2 (Green)	Channel 3 (Blue)
Range value RGB	104-184	87-161	26-121

Table 2 shows the results of Rice Leaf Folder image by using BW-RGB Masking Detection Technique. In this experiment, five different sample images is used to obtain the data. For sample image number 1, the Rice Leaf Folder has a u-shape in the leaf and the colour is yellow to green. The system detects less Rice Leaf Folder with the noise in Threshold RGB Channel image. The output image in BW-RGB Masking Threshold image detect less the presence of Rice Leaf Folder. In sample image number 2, the Rice Leaf Folder fold the leaf with longitudinal white and transparent. The system can the detect Rice Leaf Folder and edge of the object is detected in image Threshold RGB Channel and Masking image with RGB threshold. The colour of body Rice Leaf Folder in sample image number 3 have similar with the colour of leaf through observing by using naked eyes. . The edge of the object is detected in output image is more compared to sample image number 1 and sample image number 2 because the colour of the leaf is same with the colour body Rice Leaf Folder. There are fungus and a Rice Leaf Folder in sample image number 4. The masking detects the Rice Leaf Folder, white spot and grey of the background.

Table 2: The result of detecting the Rice Leaf Folder using BW-RGB Masking Technique

No	Input Image	Threshold RGB Channel Image	BW-RGB Masking Threshold Image
1			
2			
3			
4			

3.2 Colour Code Detection

There are four different sample input images of Rice Leaf Folder. Table 3 shows the Dark Green colour code detection with the RGB value is 0,100,0. In sample image number 1, the input image has three variation colour such as brown, green, and black. The output image shows black and white colour image. The edge of object is detected because the system can detect the present of the leaf. For sample image number 2, the Rice Leaf Folder roll the leaf by produce longitudinal sticky. In output image 2, the edge of the object is detected and the present of Rice Leaf Folder. There is a Rice Leaf Folder on leaf in sample image number 3 with brown and green colour. The output image can detect the Rice Leaf Folder and edge of the object is detected. There have a Rice Leaf Folder, fungus, and leaf in input image number 4. The system detects less of Rice Leaf Folder.

In Table 4, the colour code used is Dark Olive Green with the value of RGB is 85,107,47. There are four different sample used to analyse the output image. The output image 1 shown the detection of Rice Leaf Folder and edge of the object is detected. In sample image number 2, the output image shown the presence of Rice Leaf Folder roll in the leaf. For sample image number 3, the colour of black is more than white colour, but the presence of Rice Leaf Folder still can be detected on the leaf. The sample image number 4 shows the colour of white is more than black colour because edge of the object is detected.

Table 3: The process of detecting the Rice Leaf Folder using Dark Green Colour Code

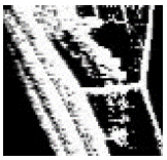
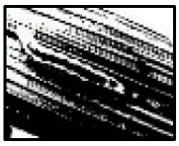
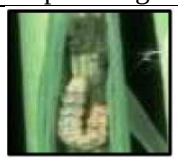
No	Input Image	Output Image
1		
2		
3		
4		

Table 4: The process of detecting the Rice Leaf Folder using Dark Olive Green Colour Code

No	Input Image	Output Image
1		
2		
3		
4		

Forest Green colour code is being used to analyse the Rice Leaf Folder and the results are shows in Table 5. In output image 1, the white colour presence Rice Leaf Folder and leaf. It means the edge of the object is detected in the image. Output image 3 shown the black colour is more than white colour. This causes the Rice Leaf Folder could not be traced in forest green colour. For sample image number 4, the black colour more on the body of Rice Leaf Folder while white colour on the leaf.

Table 5: The process of detecting the Rice Leaf Folder using Forest Green Colour Code

No	Input Image	Output Image
1		
2		
3		
4		

The colour code shows in Table 6 is Green colour. The output image in image 1 can detect presence of Rice Leaf Folder and edge of the object is detected. Output image 2 and output image 3 have more edge of the object detected because black colour is more than white colour. In output image 4, the colour of white is more on the leaf compare on the body of Rice Leaf Folder.

Table 6: The process of detecting the Rice Leaf Folder using Green Colour Code

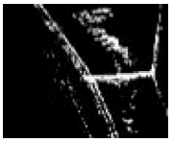
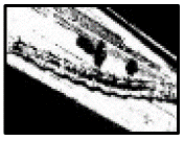
No	Input Image	Output Image
1		
2		
3		
4		

Table 7 shows the result of Rice Leaf Folder after detection using use olive colour code with the value of RGB model is 128,128,0. For output image 1, the Rice Leaf Folder can be detected via white colour of binary. The value RGB of olive colour can detect Rice Leaf Folder in output image 1 even

there have a noise. In output image 2 and output image 3, the detection of Rice Leaf Folder is less due to the colour of black is more than white colour. Output image 4 shown less detection of Rice Leaf Folder but still can detect the presence of Rice Leaf Folder on the leaf.

Table 7: The process of detecting the Rice Leaf Folder using Olive Colour Code

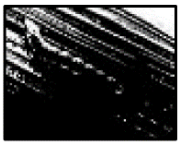
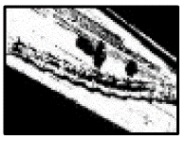
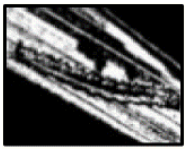
No	Input Image	Output Image
1		
2		
3		
4		

Table 8: The process of detecting the Rice Leaf Folder using Olive Drab Colour Code

No	Input Image	Output Image
1		
2		
3		
4		

The result analysis of olive drab colour has been shown in the Table 8. There are four different results by using olive drab colour due the combination of the colour in one image. Output image 2 shown presence of Rice Leaf Folder and edge of the object is detected. For output image 3, the system

less detection because the colour of black is more. The colour of black is at leaf and Rice Leaf Folder at output image 4.

4. Conclusion

In this paper, BW-RGB Masking Detection and Colour Code Detection is developed to detect the present of Rice Leaf Folder on paddy plant. The function of BW is to separate an object in the image from the background when it often produced by threshold, grayscale and colour image. Colour code is a system to display the information by using a different colour. There are four different samples of Rice Leaf Folder used for analysis. The paddy pest attack is recognized accuracy using BW-RGB masking detection while the accuracy rate for Colour Code detection is 33.33%. For future work, this system will be upgraded to an application in mobile phone. So, the paddy farmer just can use their mobile phone to detect the type of paddy pest attack.

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