Mechanized Planting Techniques of Rice in China

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Outline

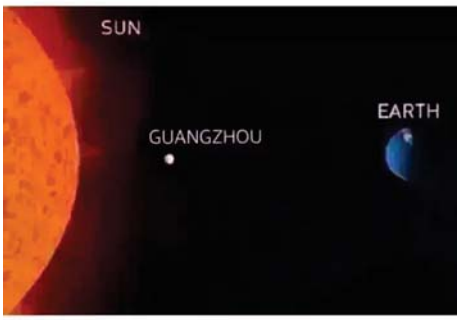
1.Introduction to rice planting in China

2. Raising machine for hybrid rice seedlings

3.Weeding machine for organic rice production

3.Rice blast detection using hyperspectral and micro image analysis

Annual average temperature is 26 ° C in Guangzhou.



1.Introduction to rice planting in China

RME1: Southern China
(two crops a year)
RME2: Central China
(rice-wheat; rice –rape)
RME3:North-eastern China
(one crop a year)

Annual harvested area is about 30 million hectares ;
The production is about 200 million tons each year.

1.Introduction to rice planting in China

Two geographical races of rice

Japonica rice	Indica rice
Short	Long to short
Roundish	Slender
Amylose content:0~20%	Amylose content:23~31%

1.Introduction to rice planting in China

RME1: Indica rice
RME2: 60% Indica
40% Japonica
RME3:Japonica rice

1.Introduction to rice planting in China

Long ping Yuan

The Father of Hybrid Rice

1.Developing the first hybrid rice varieties in the 1970s.

2.It can produce up to 30% more rice comparing to inbred rice.

3. More than 60% rice areas plant hybrid rice.

4. Most indica rices are hybrid rice in China now.

2.Raising machine for hybrid rice seedlings

Rice planting can be done in two ways

Direct seeding

Transplanting

2.Raising machine for hybrid rice seedlings

1.Hybrid rice is more vigorous at seedling stage.

2. The planting density of hybrid rice is lower than inbred rice.

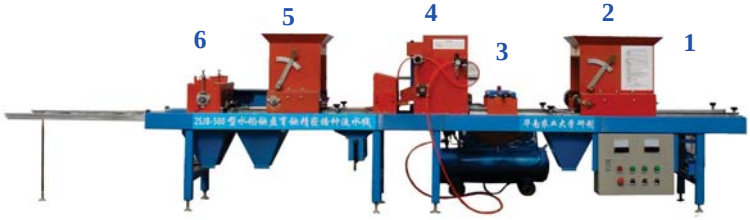
3. The seeding quantity of one tray is much lower.

4. The precision sowing is needed.

2.Raising machine for hybrid rice seedlings

Rice raising machine (Iseki, Japan)

2.Raising machine for hybrid rice seedlings



1 Feeding trays →2 Paving bed soil → 3 Watering →4 Sowing→5 Covering soil → 6 Brushing soil

2.Raising machine for hybrid rice seedlings

Pneumatic vibration sowing device

2.Raising machine for hybrid rice seedlings

1. Productivity: 500 trays/h
2. Sowing performance:2~5seeds/bowl, sowing qualified rate is ＞90%
3. The yield using this machine is 6% more than comparison.

2.Weeding machine

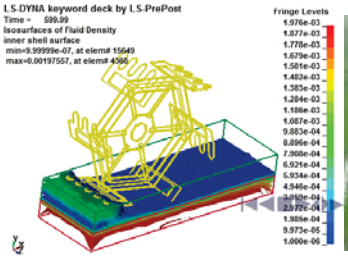
Herbicide

2.Weeding machine

Marching type weeder

Wide –weeding machine

2.Weeding machine



Marching type weeder

2.Weeding machine

Wide –weeding machine

2.Weeding machine

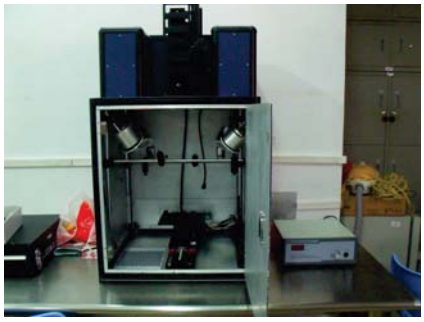
Wide –weeding machine

3.Rice blast detection using hyperspectral and micro image analysis

Leaf blast

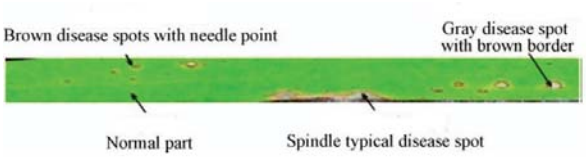
Panicle blast

3.Rice blast detection using hyperspectral and micro image analysis

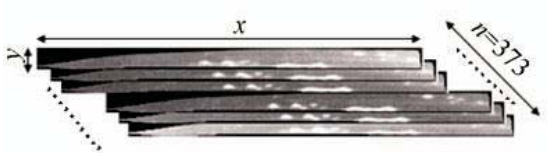


Hyperspectral imaging system

3.Rice blast detection using hyperspectral and micro image analysis

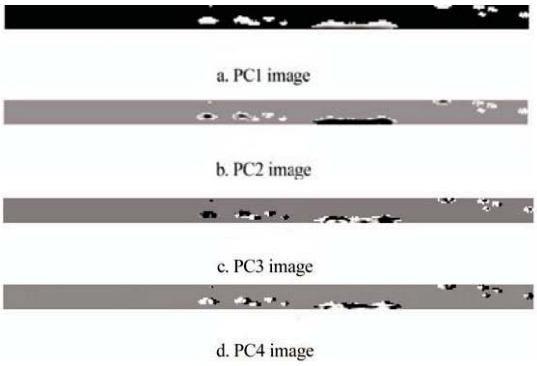


RGB image



Hyperspectral image

3.Rice blast detection using hyperspectral and micro image analysis



Pricipal Component analysis (PCA)

PC2 image was obtained to identify brown disease spots and gray disease spots

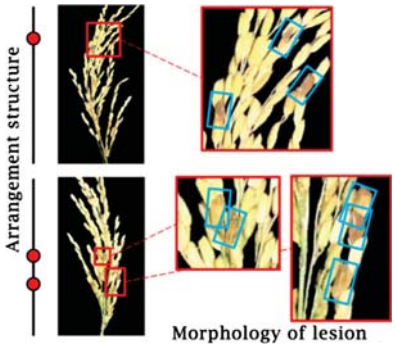
3.Rice blast detection using hyperspectral and micro image analysis

After segmentation , the shape parameters and infected area were used to grade the severity. Classification accuracy was 96%.

3.Rice blast detection using hyperspectral and micro image analysis

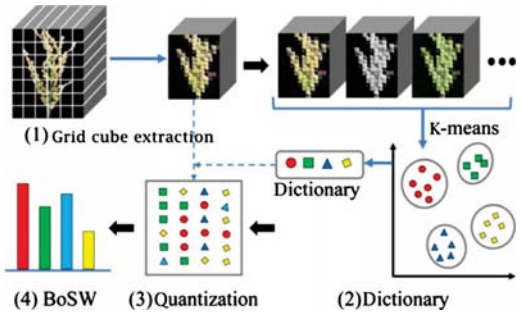
Panicle blast

3.Rice blast detection using hyperspectral and micro image analysis



Arrangement structure and morphology of lesion of infected spikelet

3.Rice blast detection using hyperspectral and micro image analysis

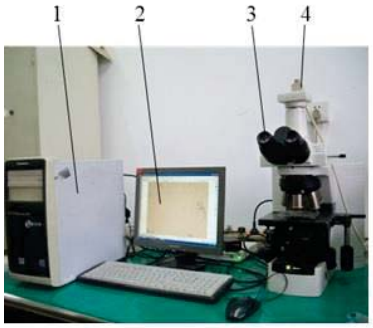


Bag of spectra words(BoSW)

3.Rice blast detection using hyperspectral and micro image analysis

Data set	BoSW	AveraFull	AveraPCA	PCAimage	SenPoCorr
First batch	80.05±4.02%	62.20±7.10%	69.51±5.12%	27.16±4.80%	60.37±6.91%
Second batch	82.60±4.42%	55.25±4.86%	65.19±4.57%	18.81±3.68%	55.06±5.78%
Combination of two batches	80.26±3.56%	60.21±3.64%	67.33±3.53%	21.71±3.42%	59.41±3.72%

3.Rice blast detection using hyperspectral and micro image analysis

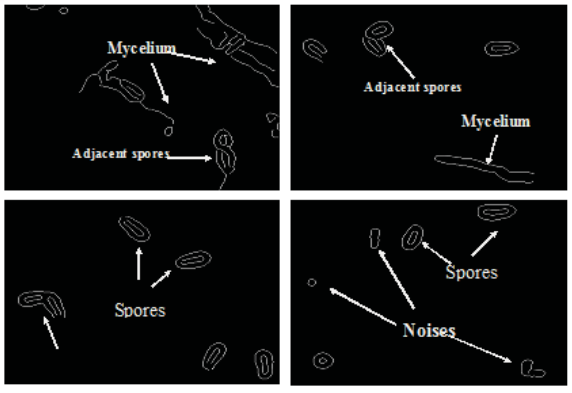


Micro imaging system

3.Rice blast detection using hyperspectral and micro image analysis

Spores of the rice blast

3.Rice blast detection using hyperspectral and micro image analysis



Edge detection using canny operator

3.Rice blast detection using hyperspectral and micro image analysis

Binary image including only spores

3.Rice blast detection using hyperspectral and micro image analysis

Adjacent spores segmentation using DT-GF-WA method

Thanks

Questions ?

Please speak slowly