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Using ICT to Improve Rice Farming

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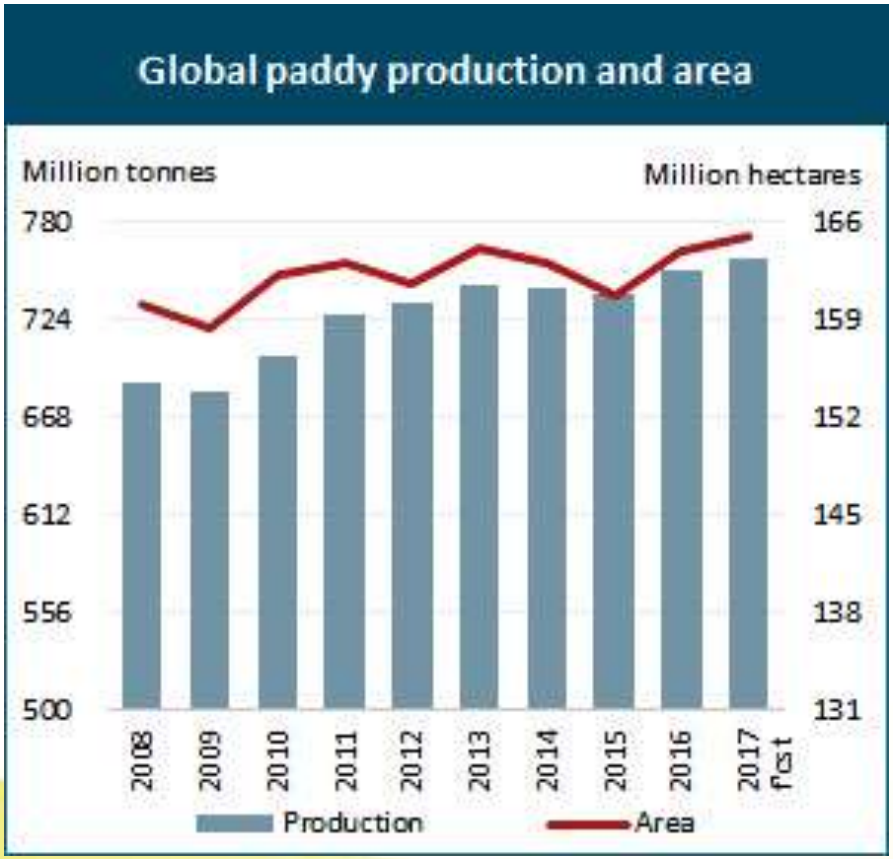
(MARDI)



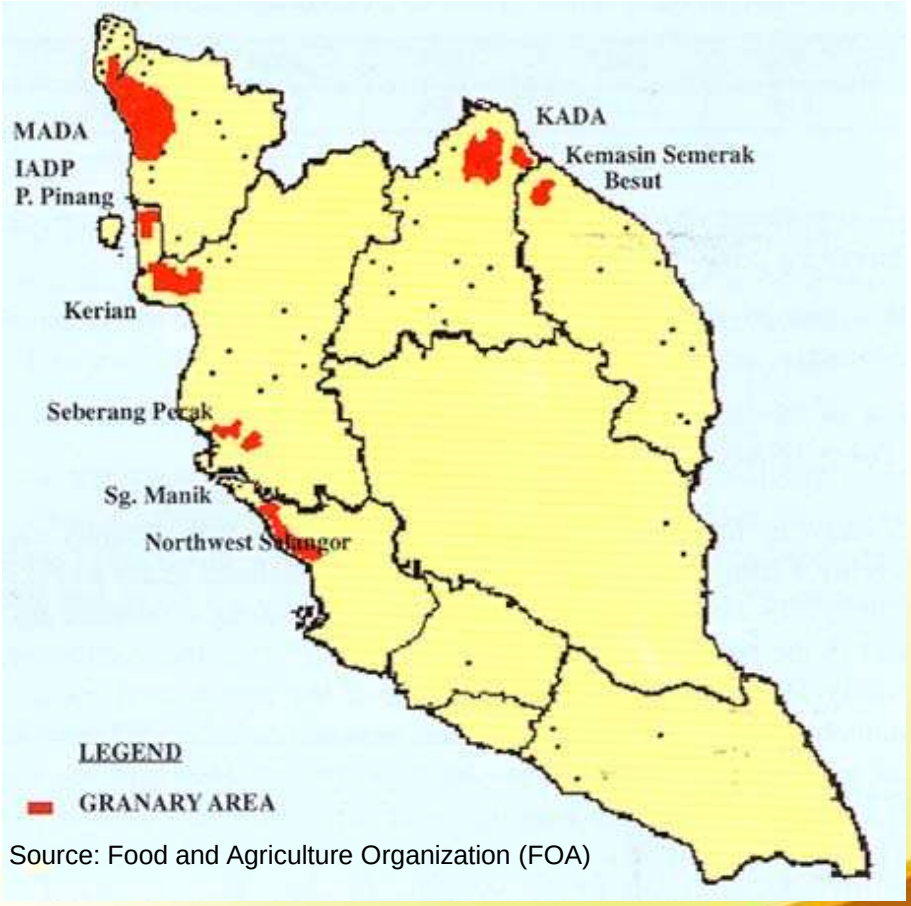
Source: IRRI

- Rice is a staple for nearly half of the world's seven billion people
- More than 90% is consumed in Asia

Rice is an important crop in Malaysia covering about 600,000 ha with an average yield of 3.0 to 5.2 t/ha

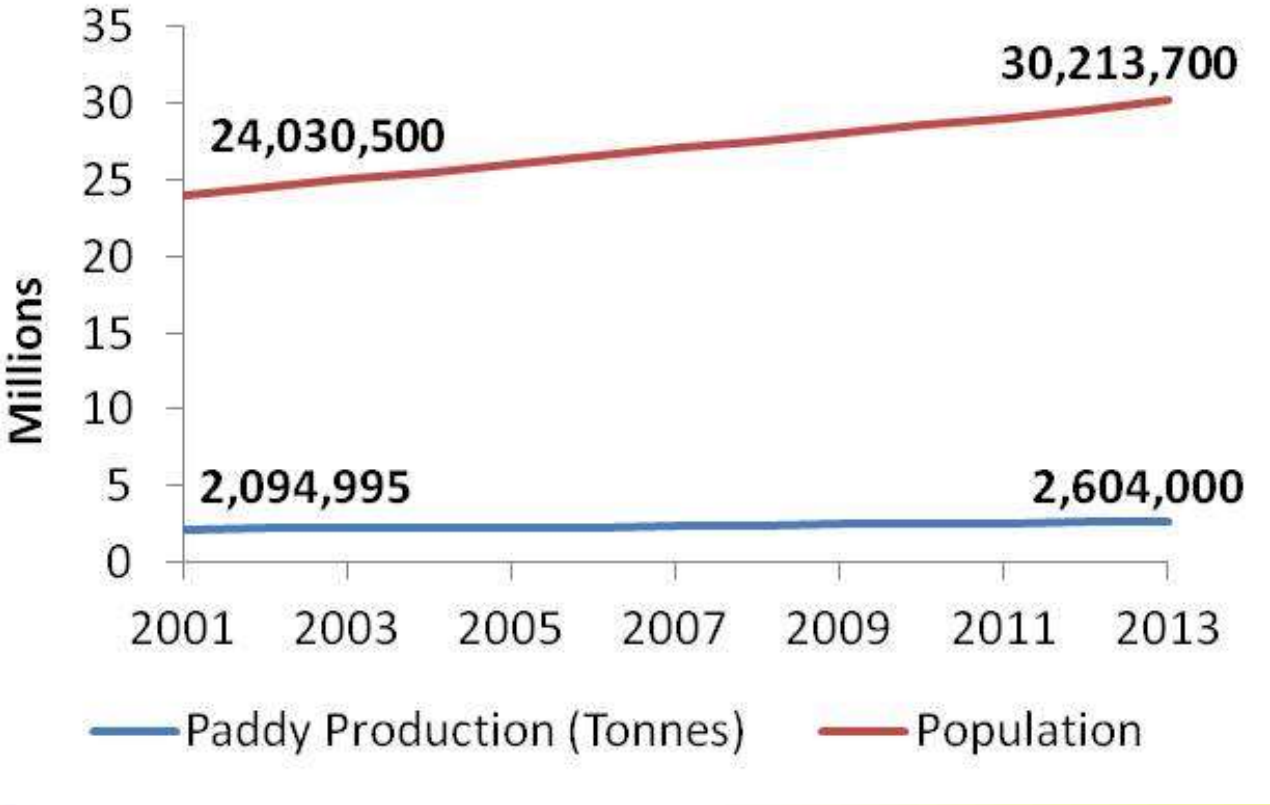
Main paddy producing granary areas:

1. Muda Agricultural Development Authority (MADA);
2. Kemubu Agricultural Development Authority (KADA);
3. Kerian-Sungai Manik Integrated Agriculture Development Area;
4. Barat Laut Selangor Integrated Agriculture Development Area;
5. Seberang Perak Integrated Agriculture Development Area;
6. Penang Integrated Agriculture Development Area;
7. North Terengganu Integrated Agriculture Development (KETARA)
8. Integrated Agriculture Development Kemasin Semerak



Source: Food and Agriculture Organization (FOA)

Population VS Paddy Production:



Population ↑ ≈ 25.7%
Paddy production ↑ ≈ 24.3%
Self-sufficiency level (SSL) ≈ 70%

Rice cultivation

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Challenges:

- **Smallholders** – average farm size ≈ 1 ha
- **Competing water resource use** – agricultural, urban and industrial
- **Scarcity of farm labour** - unattractive agricultural sector
- **Climate change** – increase number of floods and periods of drought
- **Increase cost of input use –** labour, fertilizers, chemical (i.e. insecticides, fungicides, herbicides)

ICT in Agricultural

- Offers a wide range of solutions to some agricultural challenges
- Some ICT based technologies have been developed:
  - Water management
  - Crop cultivation
  - Yield prediction

1. Water level monitoring system

- **Automatic monitoring of multi-level of water: 5cm – 10 cm**
- **Automatic alert farmers through SMS: < 5cm or >10cm**
- **Off-field monitoring**
- **Portable and lightweight**
- **Solar powered**
- **No required server**
- **Low maintenance cost**

2. Mapping using UAV and image processing technique

CROPCAM UAV platform

Manufacturer	Micropilot, Canada
Autopilot chip	MP2028g (Canada)
Body Type	Glider
Wing Span	2.438m
Weight	2.5kg
Material	Carbon Fibre reinforced frame; Balsa reinforced with EPP form, composite elements
Endurance	30 mins
Range	24km
Crusing Speed	60km/hr
Pre-flight set up time	15 min
Take off type	Hand launch
Landing Type	Belly Landing
Communication & control range	2 km
Battery	12.8V, 8400mAh
Secondary Control	via transmitter

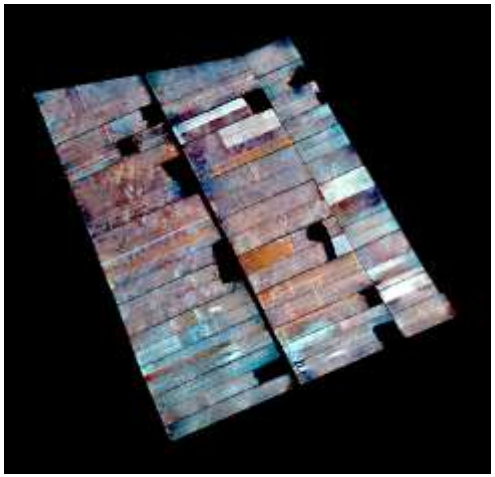
TETRA CAM ADC camera

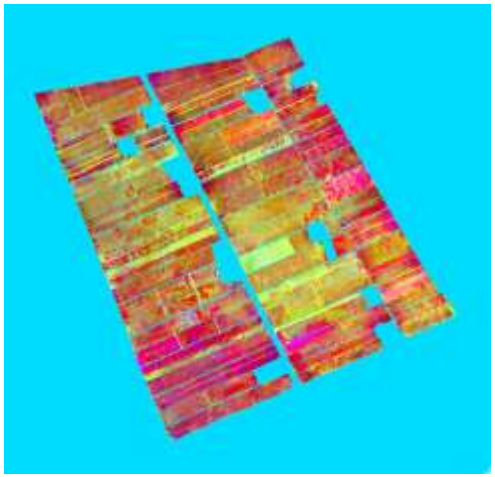
TETRA CAM ADC – Lite multispectral camera (Red, Green and Near-infrared)

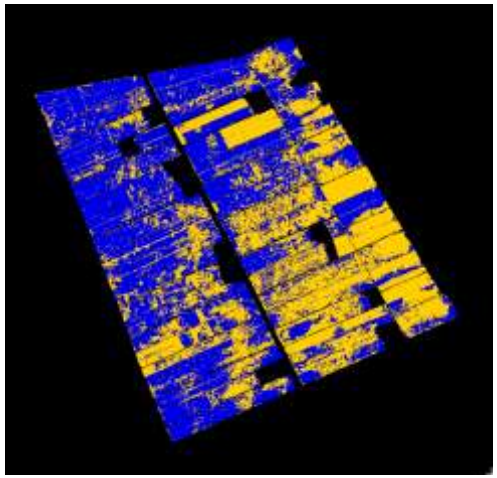
1. **Dimension: 114 mm x 77 mm x 60.5 mm with 8.5 mm lens**
2. **Weight: 200 gram**
3. **Resolution: 3.2 megapixel**

Water distribution monitoring

14 April 2013



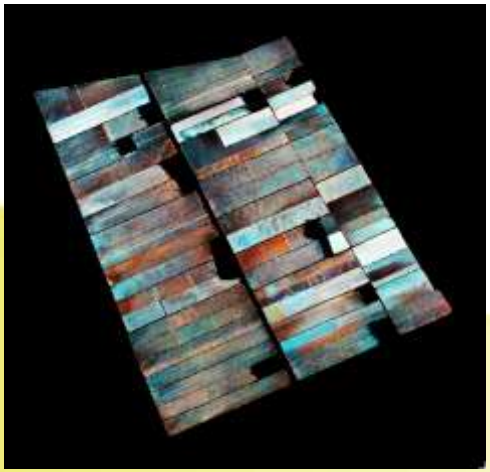


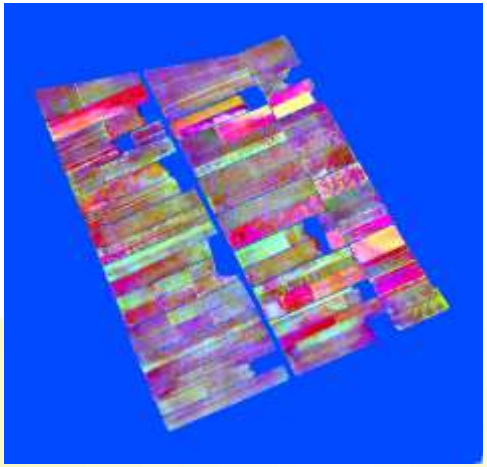


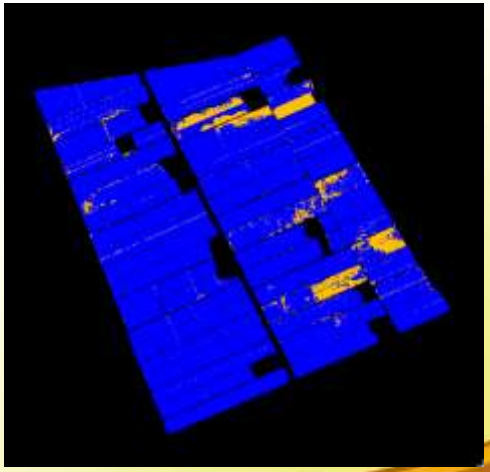
Soil (44%)

Water (56%)

18 April 2013



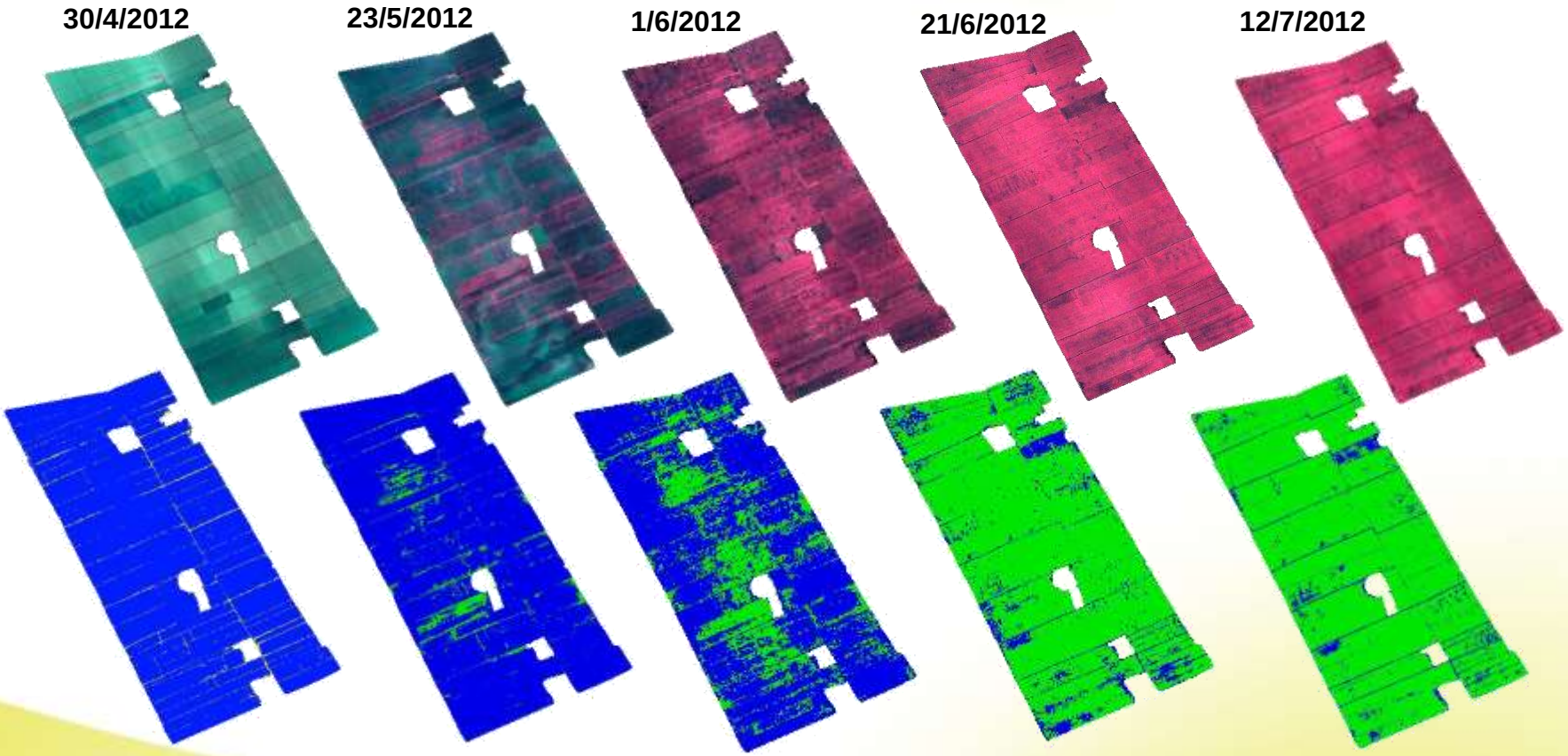




Soil (6%)

Water (94%)

Plant growth monitoring



Water (100%)

Water (84%)
Paddy (16 %)

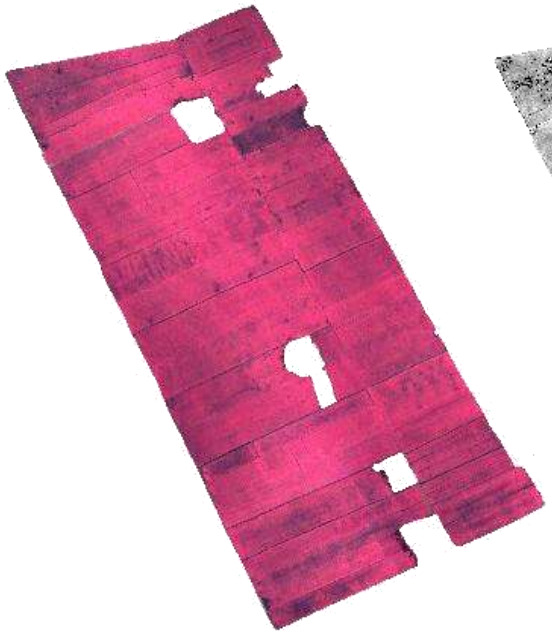
Water (73%)
Paddy (27 %)

Water (12%)
Paddy (88 %)

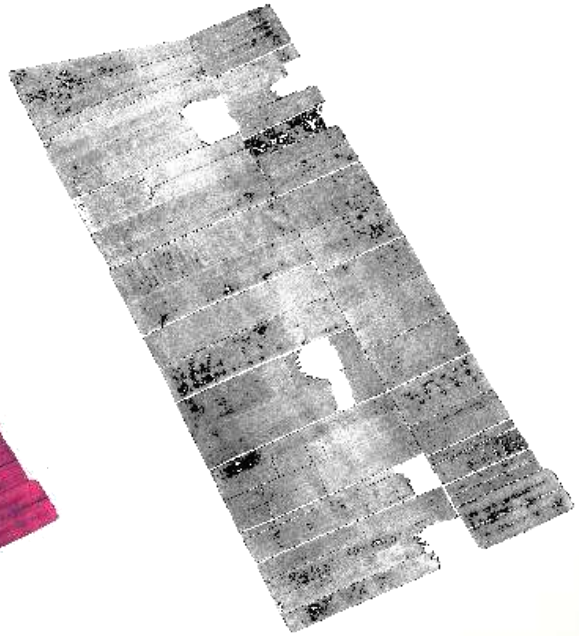
Water (7%)
Paddy (93 %)

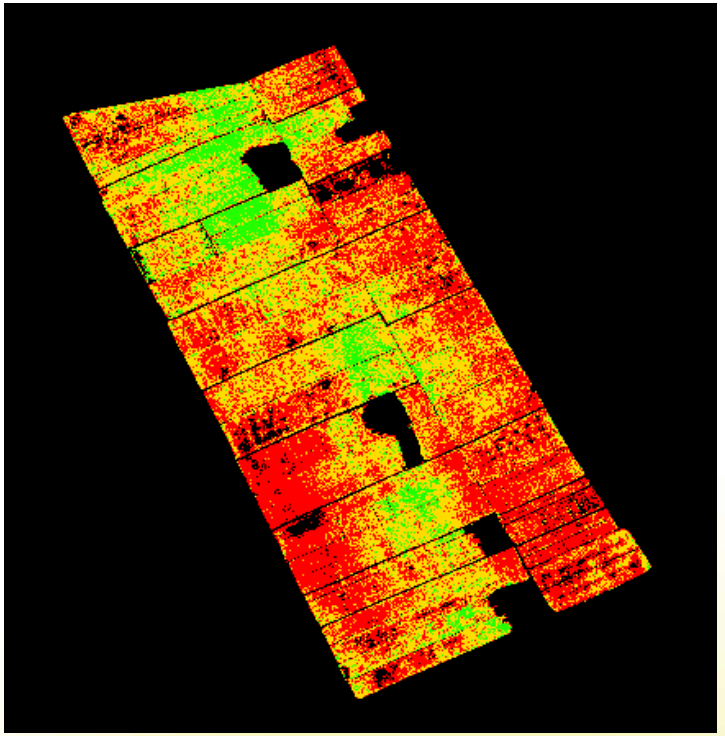
Fertilizer recommendation map

NIR, Red, Green image



SPAD value image



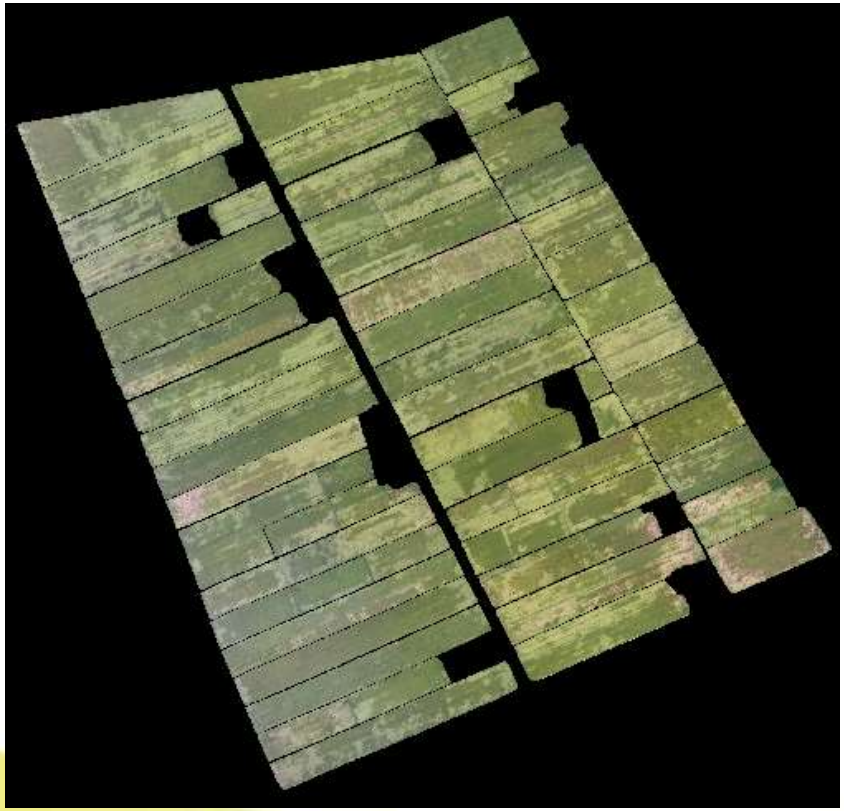


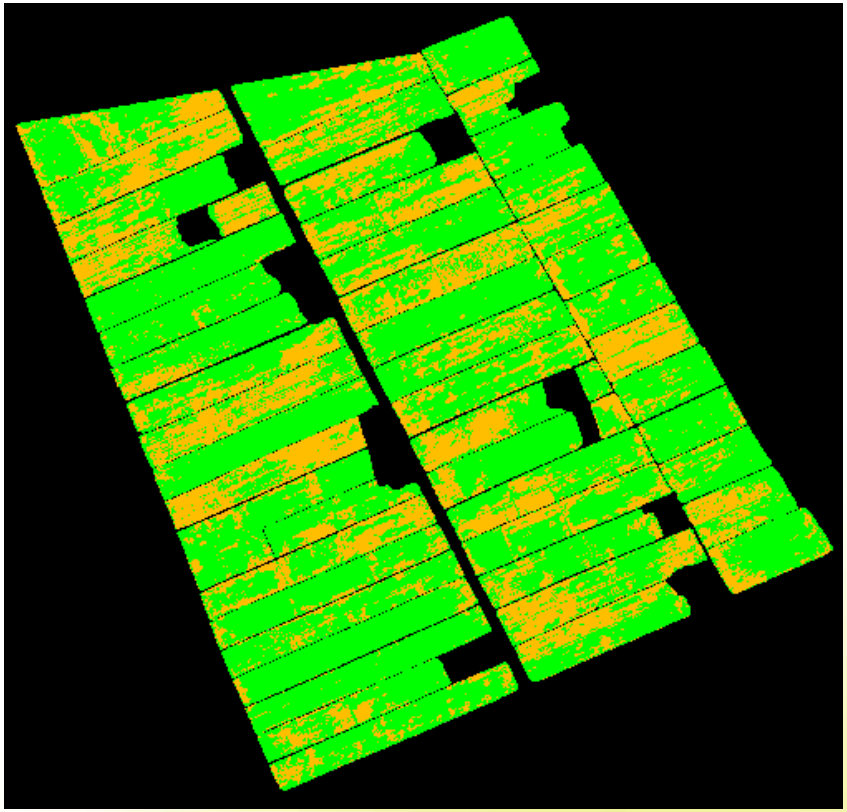
High SPAD reading

Medium SPAD reading

Low SPAD reading

Crop damage mapping

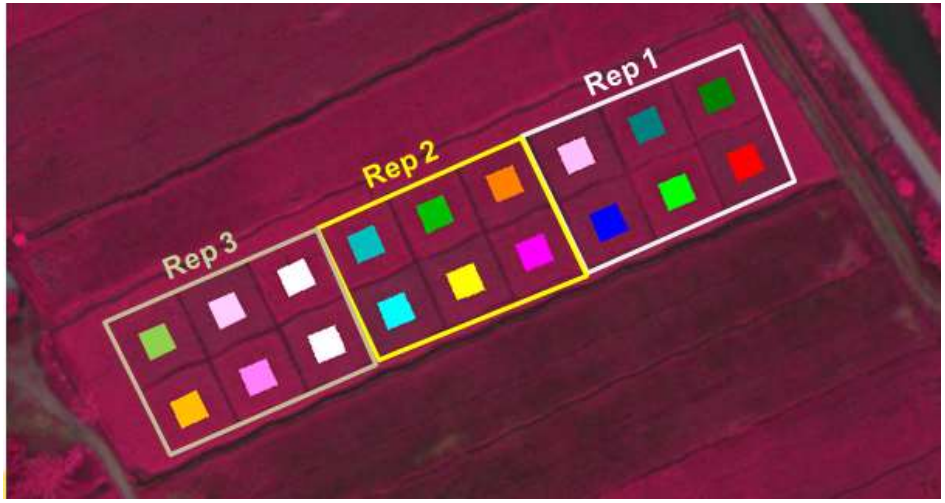


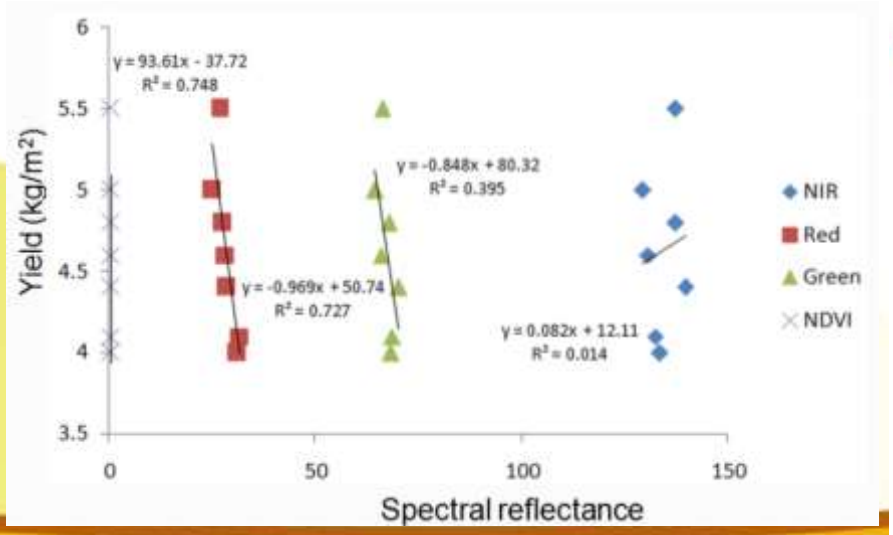


Crop area (69%)

Crop lodging area (31%)

Yield Prediction

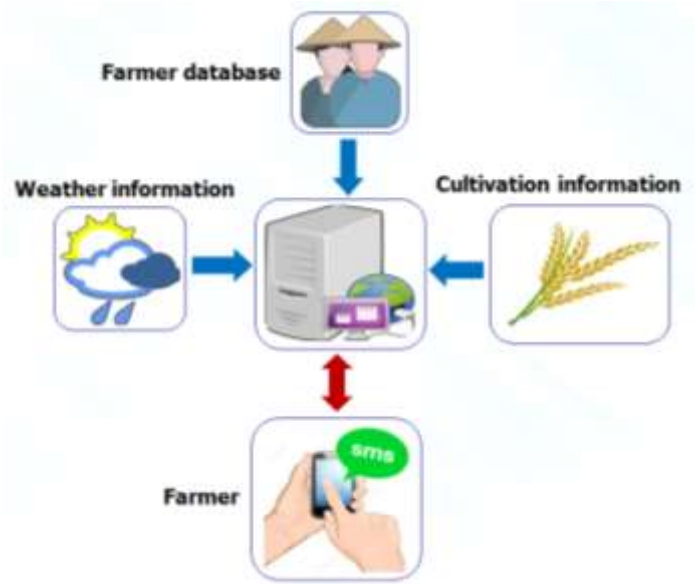




Lot	Actual Yield (kg)	Estimated Yield (kg)	Accuracy (%)
2125	9543.9	12710.5	66.8
2126	7220.9	8922.95	76.4
2127	6803.4	5923.47	87.1
2128	9187.2	9524.08	96.3
2129	8274.6	7188.01	86.9
2130	8632	9280.83	92.5
2131	8092.5	7848.11	97
2132	10126	11104.6	90.3
2133	8954.8	8949.54	99.9
2134	7221	6793.16	94.1
2135	9421.9	8657.46	91.9
2136	9761.4	9209.04	94.3
2137	10527	11667.6	89.2
2138	6796	7695.12	86.8
2139	9003.1	8402.5	93.3
2140	8256.3	7056.93	85.5
3476	4963.4	6535.16	68.3
3478	3351.4	4593.17	62.9
3480	4064	5092.15	74.7
3482	5109.5	5306.09	96.2
3484	5017	4767.36	95
3490	5794	7209.6	75.6
3492	5715	4905.66	85.8
3494	4963.4	5494.92	89.3
3496	5709	6342.24	88.9
3498	5028.7	6221.19	76.3
3500	6516.3	8799.8	65

Average accuracy: 85.4%

3. Rice cultivation activities and alert information delivery system

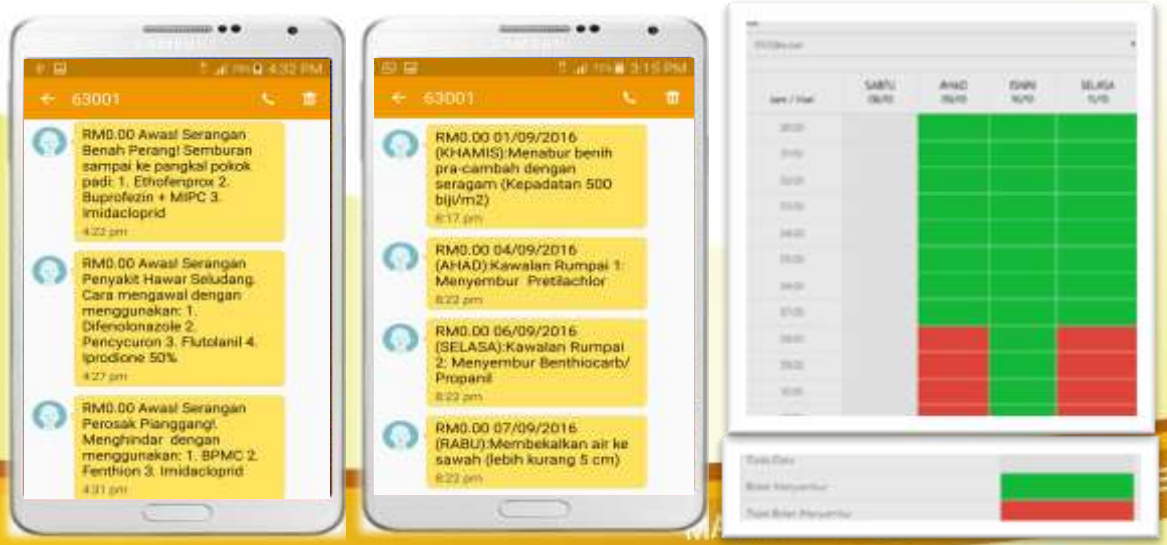


i. To generate individual cultivation activities schedule based on **variety** and **actual DAS** selected by farmer

ii. Automatic to send out daily farming activities SMS notifications on certain number of days in advance to remind farmer

iii. To send out warning SMS notifications to alert farmers

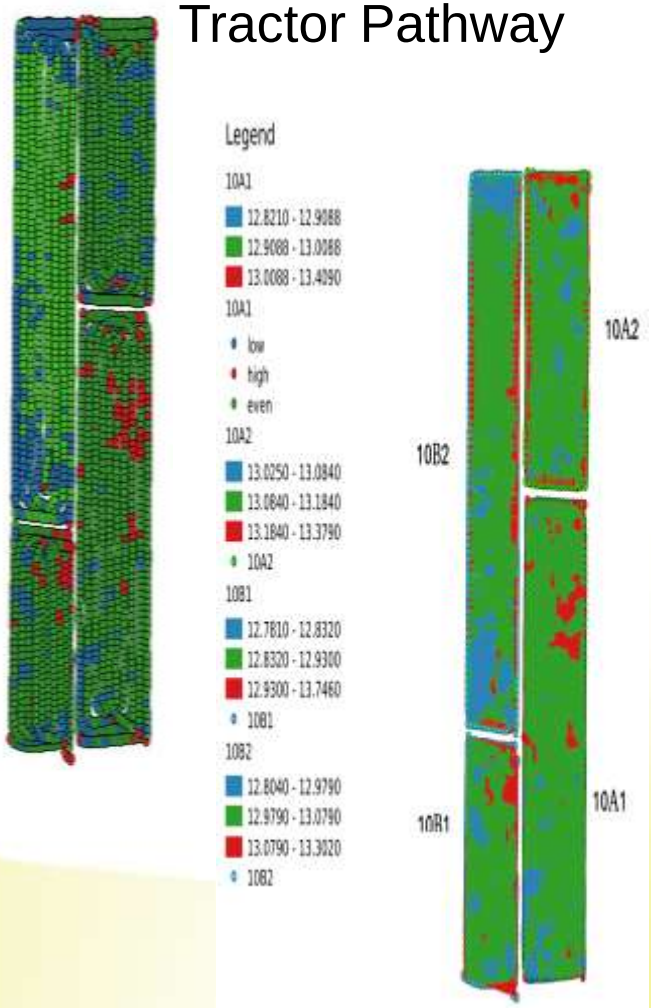
iv. Automatic to generate **spraying schedule** based on 3 day weather forecast data provided daily by Malaysian Meteorological Department (MET)



4. Land leveling system & Variable Rate Technology (VRT) Seeding

Land leveling system

Tractor Pathway



VRT Seeding

Thank you