Application of Space Based Technologies with Technical Support of JAXA and Current Activities of Department of Agricultural Land Management and Statistics (DALMS)

The Republic of the Union of Myanmar
Ministry of Agriculture, Livestock and Irrigation
Department of Agricultural Land Management and Statistics

Technical supporter- Japan Aerospace Exploration Agency

19th Sep, 2017

Vietnam- Hanoi

2. Introduction

- Myanmar is an agricultural country.
- Agriculture sector contributes 22.1% (2014-2015) of GDP, 20% of total export earnings; and employs 61.2% of the labor force.
- Under the Ministry of Agriculture, Livestock and Irrigation (MOALI), Department of Agricultural Land Management and Statistics (DALMS) is the sole agency for collection and compilation of crop and land utilization statistics.

2. Statistical System of DALMS

. DALMS uses complete enumeration method in collecting agricultural statistics based on cadastral/ Kwin maps and their registers.

. Surveyors have to visit each and every field plot and record type of crops grown, cropping patterns, crop variety, crop failures and other information on demand.

. DALMS operates through a network of 15 regions/ states, 65 districts and 295 Township Level Offices.

. Statistical data is aggregated by level by level from Kwins, to Village Tracts, then, to Circles, to Townships, to Districts, to Regions/States offices and submitted to the headquarters in Naypyitaw.

3. Periodicity of data collection

- Myanmar produces a wide range of crops which have different times of sowing, growing and harvesting.
- In other words, there is continuous planting and harvesting of crops throughout the year.
- To cover all the agricultural activities, surveyors of DALMS have to prepare a field program to conduct crop surveys according to the different crop seasons and the different agricultural operations.

4. Current Situation and Difficulties of Data Collecting System

- Work load is overburden for surveyors
- Some Kwin Maps (Cadastral Maps) are out dated
- Data collecting, analyzing and compilation processes are complex and take time
- Staffs from department are trying hard to reach the satisfaction on needs of information in rural/urban development planning and disaster management.

4. SAFE Project with JAXA

- JAXA provide data and support in technical trainings and advisory
- Objectives
  - To innovate the system of rice crop area mapping and yield monitoring through using SAR data
  - To substitute the existing agricultural statistical system with modern space application technologies
  - Study Area of the Project
  - Study Area is Lewe Township near Naypyitaw
  - Located in middle of Myanmar and Semi-Arid Region
  - Project Period
  - January 2016 – December 2017

5. Status of the SAFE Project

- Training of ALOS2 and INAHOR applications with SAR data to DALMS staffs
- Conducted field survey and developed rice planted area map with INAHOR
- Analyzing of developed map with ground data
- Studying the ways to incorporate both results

6. Field Survey for INAHOR Tuning and Validation

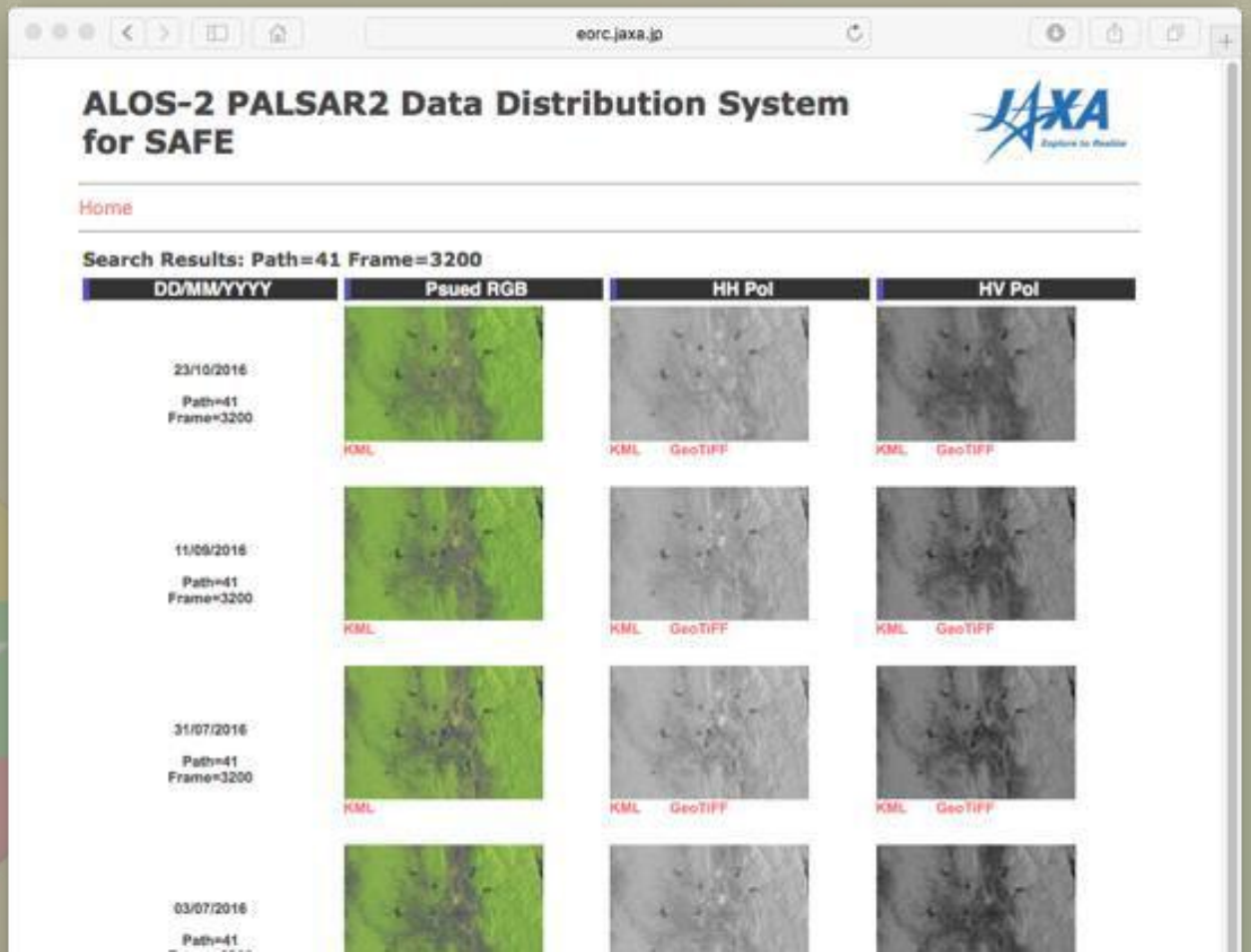
- Randomly selected 14 sample plots
- Each plot size is 200m x 200m
- Percent of rice-planted area in each plot and phonological stage

Sample Plot Example : 200 x 200m

Surveying Sheet

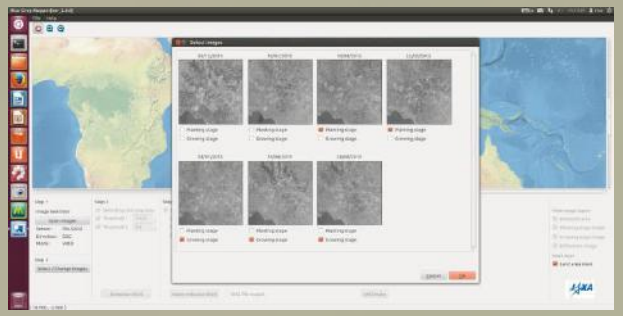
7. ALOS-2 Data

- Download the ALOS-2 data for rice-planted area estimation with INAHOR



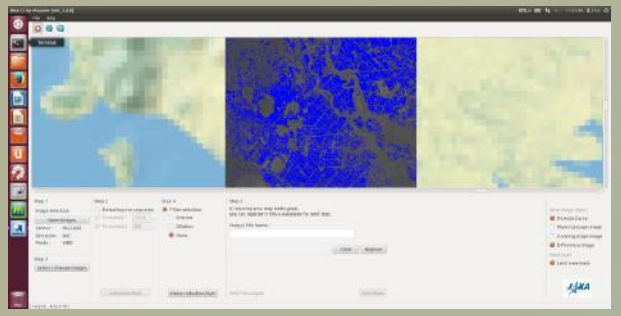
8. Rice Planted Area Mapping Software (INAHOR) developed by JAXA/RESTEC

- Selecting ALOS-2 images in planting season and well-grown season

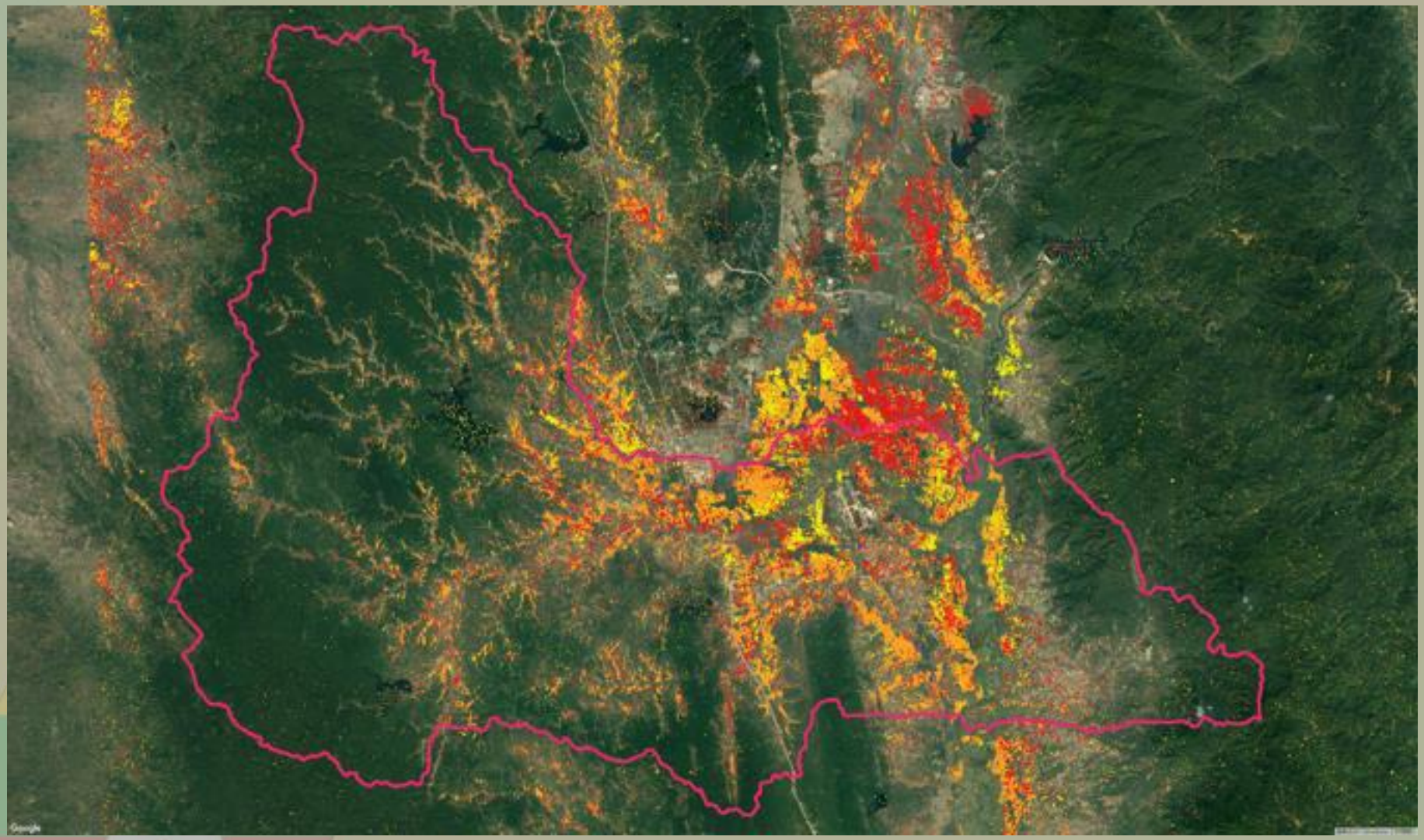


- Input two threshold (min and range) fine-tuned based on the field survey data

- Identify rice-planted areas



11. Result of Rice-Plated Area Map on Google Earth

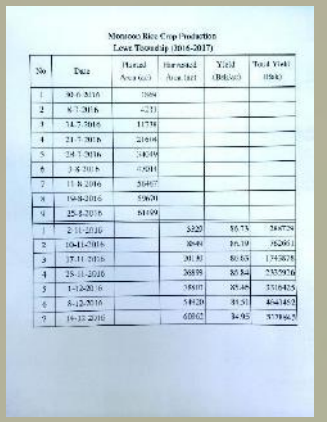


Estimated Planting Date

■ : 03/07/2016 ■ : 31/07/2016 ■ : 11/09/2016

11. Evaluation of the Result: Statistics

- INAHOR with ALOS-2 derived statistics was highly agree with the DALMS's official statistics.
- But, compensation of overestimation and underestimation areas was found.



Monsoon rice of Lewe Township in 2016

	Rice-Planted Area (ha)	Rice-Planted Area (acre)
Official Statistics	-	**61,499**
INAHOR Results	25,227	**62,338**

Difference (INAHOR-Official) : 839 acre
Error Ratio (INAHOR/Official) : 101.4 %

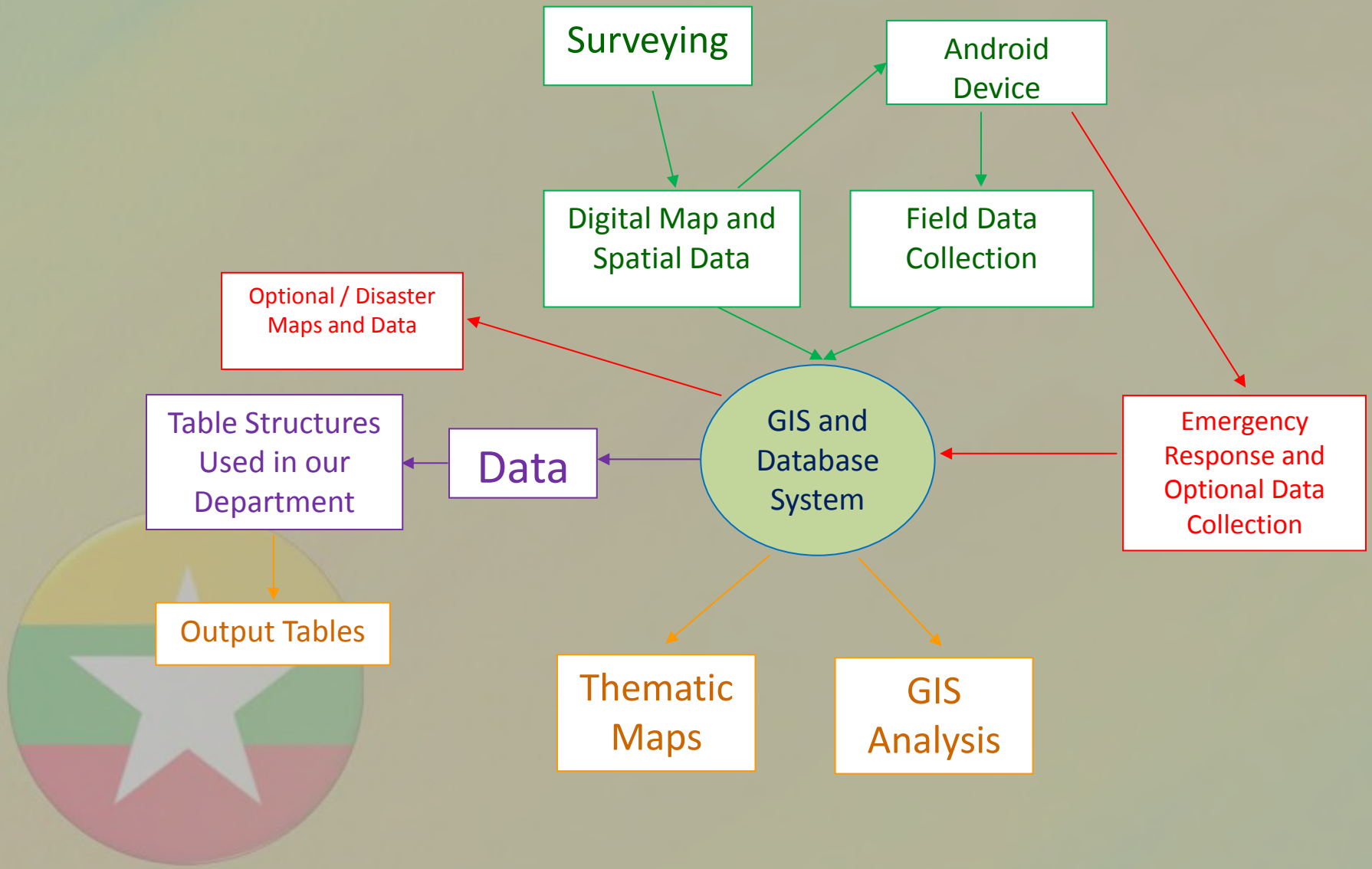
12. On Going

- Additional Field Surveying and Mapping to incorporate the data from remotely sensed images and field records
- Additional Training
- Stake Holders Meeting

Implementing GIS and Database Model for DALMS

- Objectives
  - to replace the old style manual system with automated computer system
  - to get accurate agricultural statistics
  - to monitor the field staffs
  - to development remote sensing technology in future

Work Flow Chart



- **Android Program for Field Data Collection is Developed**

109-02-2017 11:01:	1	23413N	11/5	25000000000000000000000000000011 404019100
109-02-2017 11:05:	1	23413N	11/4	25001831098490900095625397044121 404023300
109-02-2017 11:10:	1	23413N	11/3	25001831213234300095629630773111 404007300
109-02-2017 11:12:	1	23413N	9sha/1	25001831215211000095629668220111 404027900
109-02-2017 11:17:	1	23413N	9sha/2	25001831180019500095628145232111 404034400
109-02-2017 11:19:	1	23413N	9sha/3	25001831180276100095628193631111 404009400
109-02-2017 11:21:	1	23413N	9sa/1	25001831180266700095628059780121 404025000
109-02-2017 11:26:	1	23413N	9sa/2	25001831180236600095627206150121 404019500
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109-02-2017 11:29:	1	23413N	8/2	25001831180822500095627257136121 404037200
109-02-2017 11:32:	1	23413N	8/1	25001831180069900095626770837121 404067100
109-02-2017 11:34:	1	23413N	7ka/1	25001831181295300095626730333121 404043500
109-02-2017 11:39:	1	23413N	7ka/2	25001831099809700095625371451121 404021700
109-02-20				4025700
109-02-20				4060800
109-02-2017 11:44:				404033700
109-02-2017 11:46:	1	23413N	6/3	25001831098490900095625397044121 404014200
109-02-2017 11:47:	1	23413N	6/4	2500183109849(
109-02-2017 11:50:	1	23413N	5ka/1	2500183109849(
109-02-2017 11:52:	1	23413N	5ka/1	2500183109849(

Synchronized Data

LAT	LONG	DATE	TSP	VT	KNO	HNO	ASEASON	CSEASON	CHOICE	MXC	MTOT	OTT	COH	MIX_CROP
18.31297	95.62977	9/2/2017 11:01	1	23	413N	5-Nov	2	5	1	1			4	40191
18.31098	95.6254	9/2/2017 11:05	1	23	413N	4-Nov	2	5	1	1			4	40233
18.31213	95.62963	9/2/2017 11:10	1	23	413N	3-Nov	2	5	1	1			4	40073
18.31215	95.62967	9/2/2017 11:12	1	23	413N	9sha/1	2	5	1	1			4	40279
18.3118	95.62815	9/2/2017 11:17	1	23	413N	9sha/2	2	5	1	1			4	40344
18.3118	95.62819	9/2/2017 11:19	1	23	413N	9sha/3	2	5	1	1			4	40094
18.3118	95.62806	9/2/2017 11:21	1	23	413N	9sa/1	2	5	1	2	1		4	40250
18.3118	95.62721	9/2/2017 11:26	1	23	413N	9sa/2	2	5	1	2	1		4	40195
18.3118	95.62723	9/2/2017 11:27	1	23	413N	9sa/3	2	5	1	2	1		4	40035
18.31181	95.62726	9/2/2017 11:29	1	23	413N	2-Aug	2	5	1	2	1		4	40372
18.3118	95.62677	9/2/2017 11:32	1	23	413N	1-Aug	2	5	1	2	1		4	40671
18.31181	95.62673	9/2/2017 11:34	1	23	413N	7ka/1	2	5	1	2	1		4	40435
18.311	95.62537	9/2/2017 11:39	1	23	413N	7ka/2	2	5	1	2	1		4	40217
18.31098	95.6254	9/2/2017 11:41	1	23	413N	7kha	2	5	1	2	1		4	40257
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18.31098	95.6254	9/2/2017									1		4	40337
18.31098	95.6254	9/2/2017									1		4	40142
18.31098	95.6254	9/2/2017									1		4	40115
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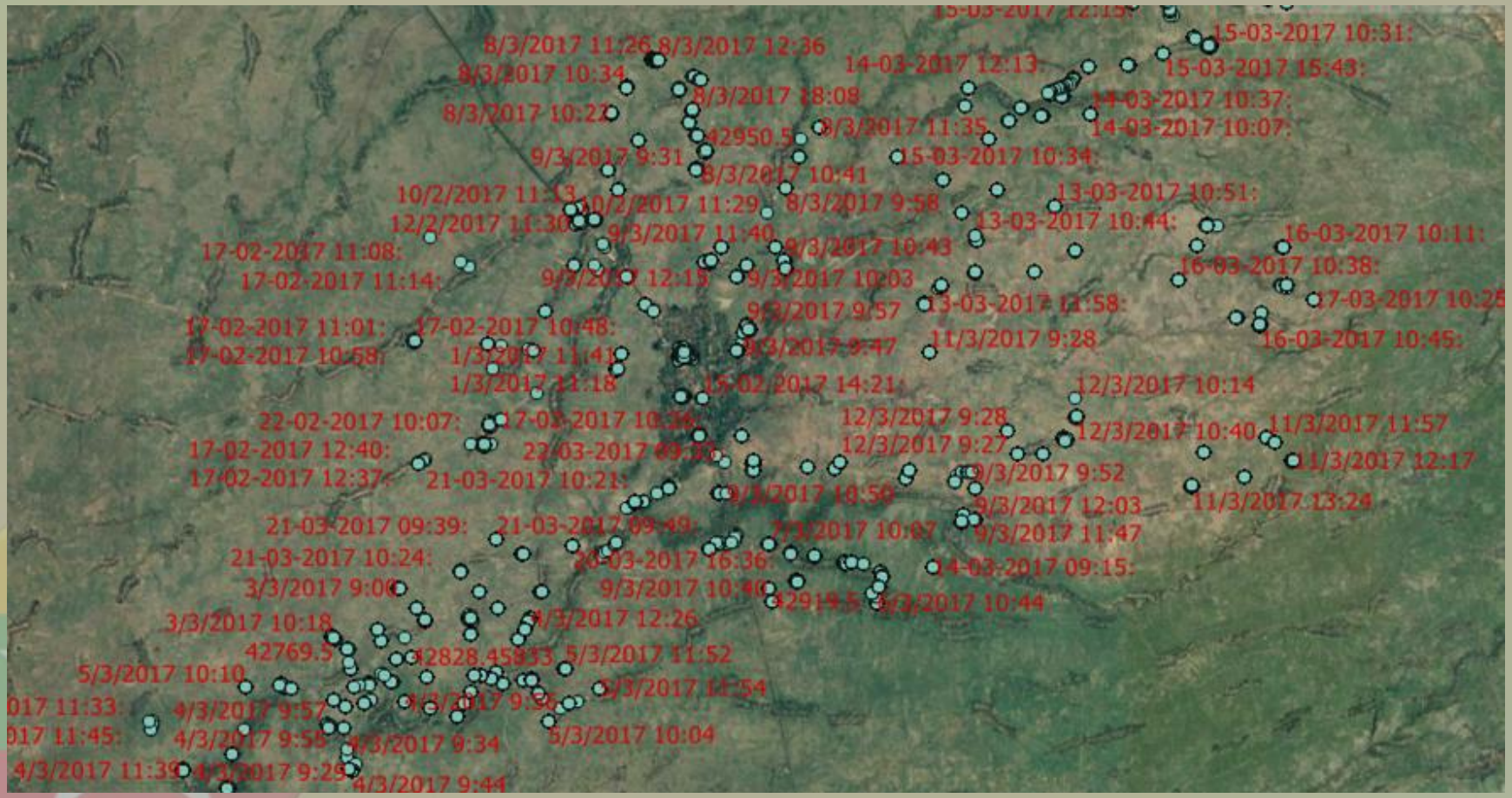
18.31098	95.6254	9/2/2017 11:52	1	23	413N	5ka/1	2	5	1	2	1		4	40177
18.31098	95.6254	9/2/2017 11:53	1	23	413N	4gha/1	2	5	1	2	1		4	40369
18.31098	95.6254	9/2/2017 11:55	1	23	413N	4gha/1	2	5	1	2	1		4	40369
18.31098	95.6254	9/2/2017 11:58	1	23	413N	4gha/3	2	5	1	2	1		4	40125
18.31098	95.6254	9/2/2017 12:01	1	23	413N	1-Mar	2	5	1	2	1		4	40178

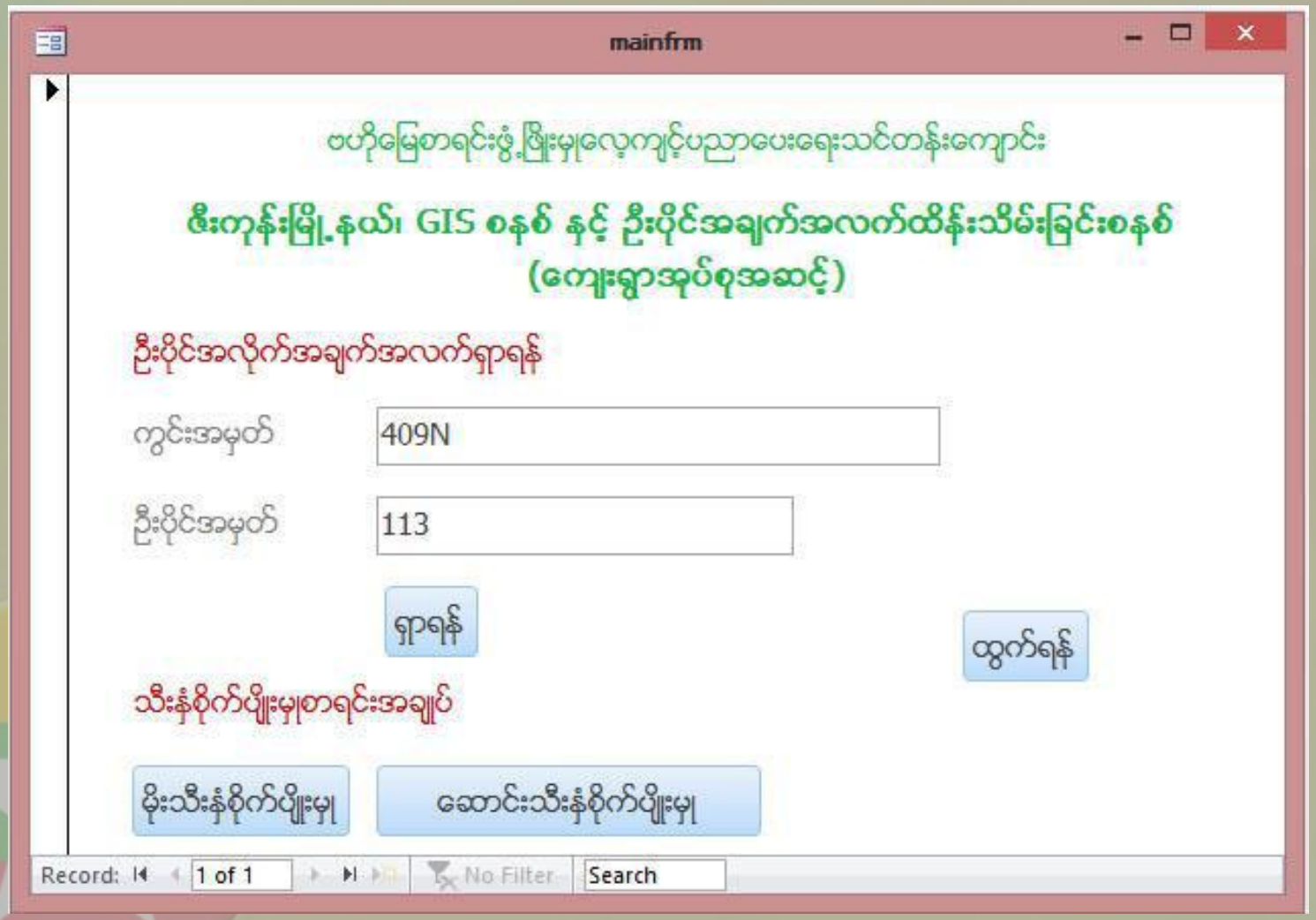
Translated into Database

980c2ddc18cd0b0d

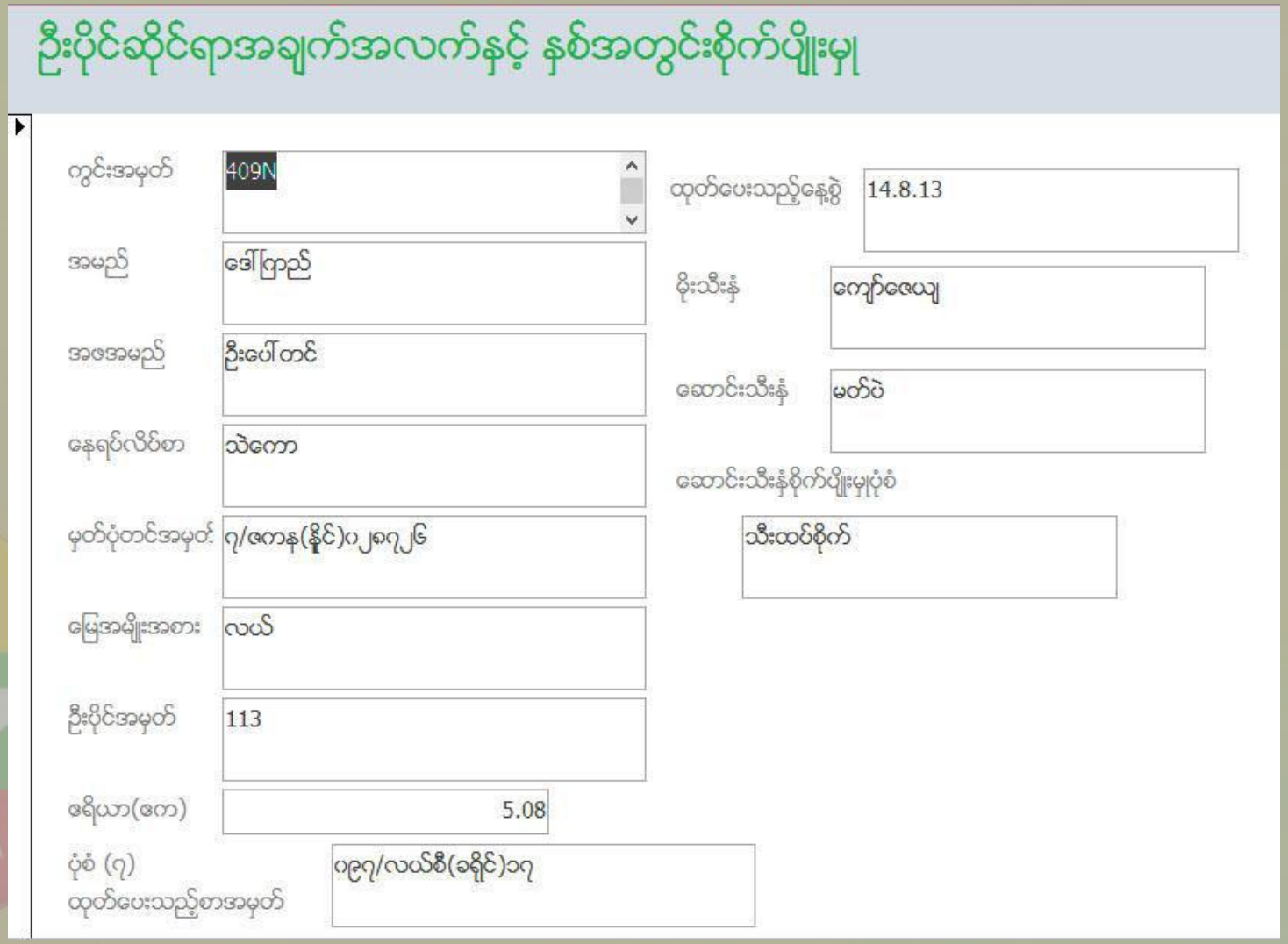
Monitoring of Field Staffs in synchronizing where they collected and when



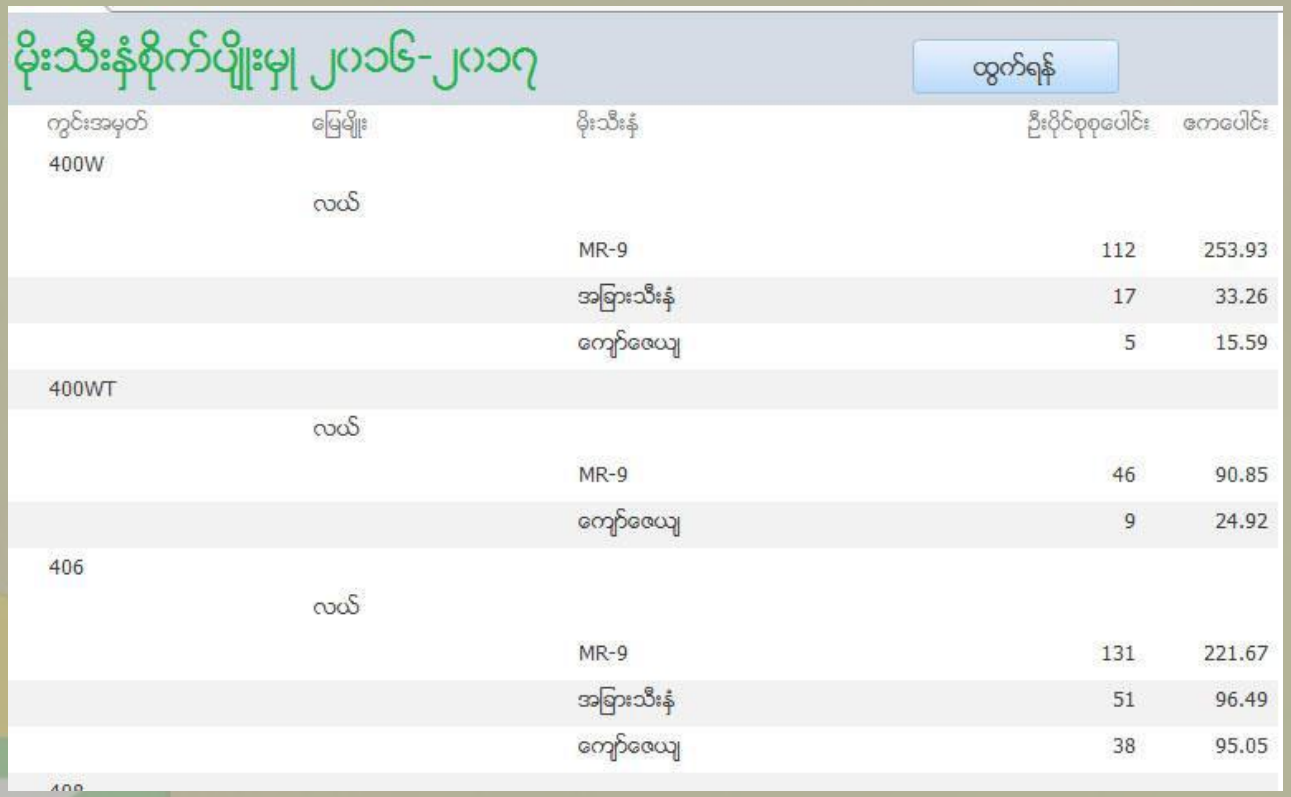
Database Providing Search Facility for Holding Information of Farmers



Search Result of Holding Information of a farmer including what crop was planted and planted area within collecting year



Producing Agricultural Statistics with Options of by Kwin/ by Crop/ by Land Type

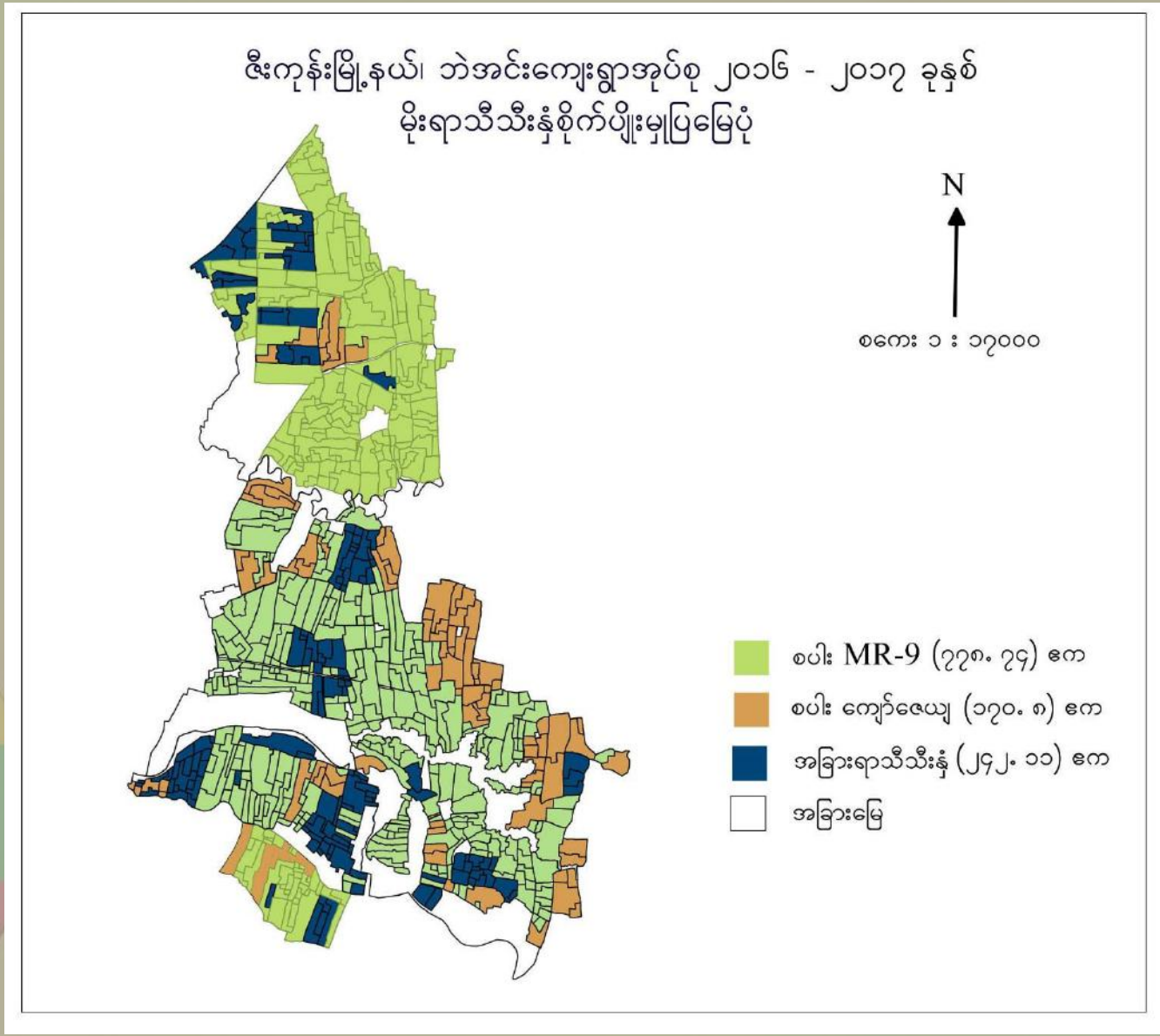


မိုးသီးနှံစိုက်ပျိုးမှု ၂၀၁၆-၂၀၁၇

ထွက်ရန်

ကွင်းအမှတ်	မြေမျိုး	မိုးသီးနှံ	ဦးပိုင်စုစုပေါင်း	ကောပေါင်း
400W				
	လယ်			
		MR-9	112	253.93
		အခြားသီးနှံ	17	33.26
		ကျော်ဇေယျ	5	15.59
400WT				
	လယ်			
		MR-9	46	90.85
		ကျော်ဇေယျ	9	24.92
406				
	လယ်			
		MR-9	131	221.67
		အခြားသီးနှံ	51	96.49
		ကျော်ဇေယျ	38	95.05

Map of Paddy Production of a Village Tract from GIS



On Going

- Set Up in other townships
- Study of the planted area with remotely sensed images along with recorded data
- Study to calculated the planted area with remotely sensed images and recorded data before the field observation to check the validity
- Further development of space based technologies in agricultural sector

Thanks You