



# CURRENT AGRONOMY ACTIVITIES, RESULTS, PROPOSED VALUE CHAIN ENGAGEMENT IN NORTH SUMATERA

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# EXISTING CONDITION OF CASSAVA IN INDONESIA

Cassava is not a priority commodity in the ministry of agriculture program

Focus of activities are still achieving self sufficiency for paddy, corn, soybean, onion, meat, sugar, red chili, coffee, cocoa, palm oil, and rubber

Although cassava actually has an important role in supporting food security and food diversification. In case of North Sumatera is important cash crop



# 10 Cassava Superior Varieties in Indonesia



**UK 1 Agritan**  
The newest

VARIETIES	RELEASED YEAR	YIELD POTENTIAL (t. ha <sup>-1</sup> )	Utilization/specific characters
Adira 1	1978	22.0	Consumption
Adira 4	1987	35.0	Tapioca
Malang 1	1992	36.5	Consumption
Darul Hidayah	1998	102.1	Consumption
UJ 3	2000	20.0 – 35.0	Tapioca
UJ 5 (KU 50)	2000	25.0 – 38.0	Tapioca
Malang 4	2001	39.7	Tapioca
Malang 6	2001	36.4	Tapioca
Litbang UK 2	2012	42.2	Bio-ethanol
UK 1 Agritan	2016	30.2	Early maturity

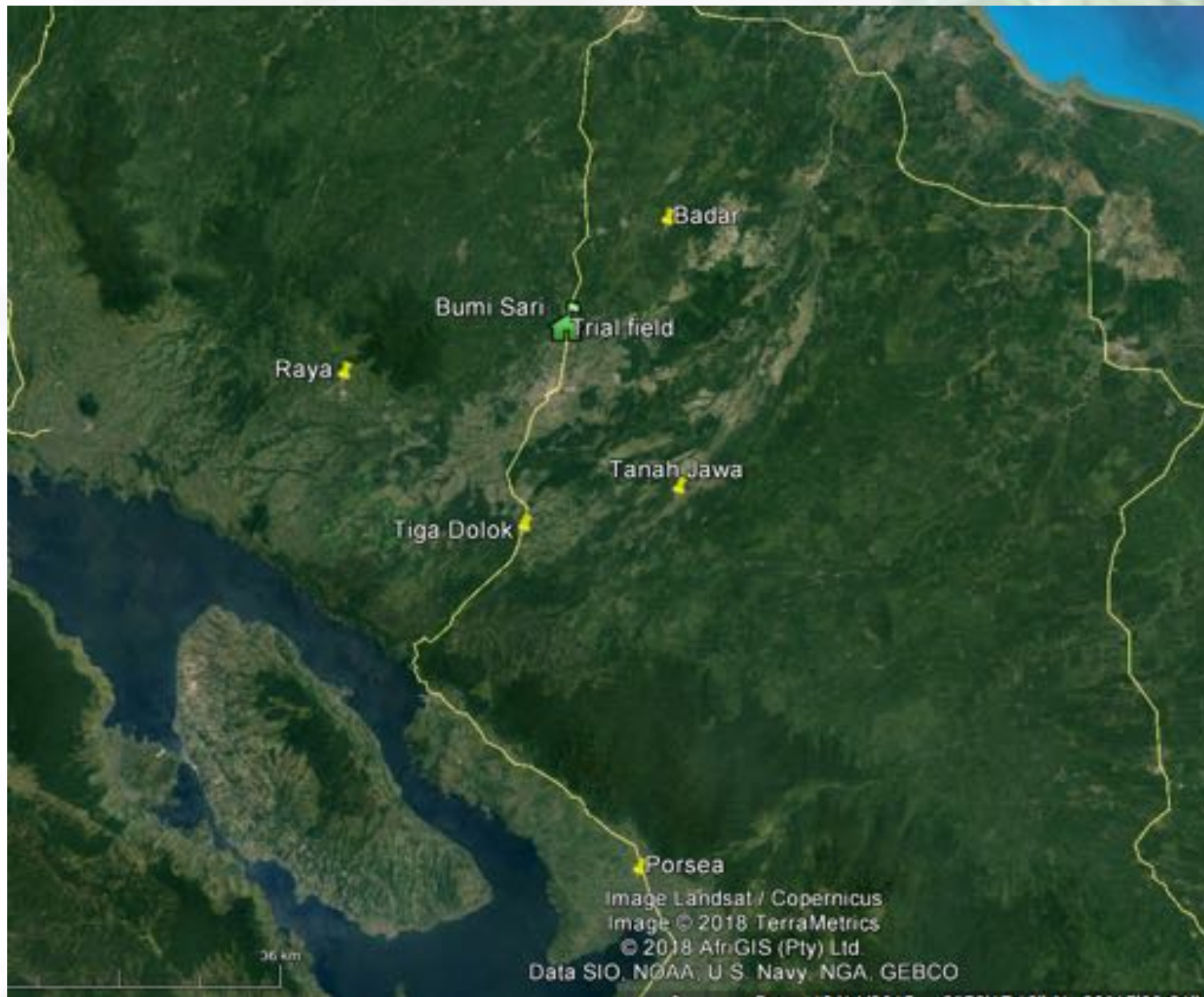
**Currently, two other varieties (Adira 2 and Malang 2) are difficult to find**



- **The long term strategy: information and technology back along the value chain**







7



Agents



Trader





# EXPERIMENT RESULT IN NORTH SUMATERA

Source of fertilizer



Explanation before application

Fertilizer application



## SOIL ANALYSIS RESULTS FROM EXPERIMENTAL FARM PT BUMISARI PRIMA

Sample	pH	Organic matter	N	P	K	Ca	Mg	Al
		%		ppm	me/100 g			
Siantar 1	4.5	2.04	0.11	3.78	0.15	0.78	0.21	1.98
Siantar 2	4.3	1.76	0.08	3.99	0.14	0.76	0.22	2.04
Siantar 3	4.4	2.16	0.12	4.04	0.23	0.87	0.34	2.11
Criteria	Acid	Low	Low	Low	Low	Low	Low	Medium

**Note: soil samples were taken randomly from field used as site of experiment.**



# INTRODUCING NEW VARIETIES

Cassava above ground parameter observed of twelve cassava genotypes, Pematang Siantar, North Sumatra 2015/2016.

Genotypes	Plant height	Forking/ branching height	Stem diameter	Weight of stem (kg/plant)		
				Basal	Middle	Upper with leaves
	.....cm.....					
UB1/2	254	135	3.25	4.0	2.9	2.5
UB1472	200	140	3.05	3.6	2.8	2.5
Adira 1	208	140	2.45	3.7	2.9	2.5
Malang 4	310	254	2.75	4.3	2.7	2.3
Cecek Ijo	233	74	2.61	3.5	2.4	2.0
Faroka	291	118	3.16	4.2	2.8	2.3
Gajah	290	95	2.50	4.1	2.7	2.3
Ketan	225	84	3.13	3.1	2.2	1.9
Kaspro	189	128	2.85	3.2	2.2	1.8
Malaysia	174	86	2.10	3.7	2.6	1.9
Adira 4	259	106	2.58	3.8	3.0	2.6
Cikaret	253	103	2.33	3.1	2.9	2.2
LSD 5%	52.25	51.26	0.53	0.2	0.2	0.6
CV (%)	15.11	29.26	13.45	3.91	4.90	5.63

11



Yield and yield component of twelve cassava genotypes,  
Pematang Siantar, North Sumatra 2015/2016.

Varieties	Number of root	Root diameter	Root length	Root yield (t/ha)
		..... cm .....		t/ha
UB1/2	9	6.5	30.9	38.72
UB1472	8	5.9	29.9	35.75
Adira 1	10	6.4	28.1	36.30
<b>Malang 4</b>	<b>13</b>	<b>8.0</b>	<b>28.9</b>	<b>49.83</b>
Cecek Ijo	9	5.0	27.6	19.14
Faroka	13	6.0	41.5	41.69
Gajah	10	5.9	31.0	31.46
Ketan	9	5.8	31.1	20.57
Kaspro	10	6.0	31.3	27.83
Malaysia	12	6.3	30.9	41.03
Adira 4	12	6.1	31.1	27.39
Cikaret	10	6.3	30.6	25.96
LSD 5%	1.3	0.7	1.86	9.86
CV (%)	8.75	7.75	4.16	22.87

12



# FARMERS RESPONSE TO SOME CASAVA VARIETIES

Selection criteria applied by farmers, traders indigenously and factory during the harvest of variety trial, 24-26 October 2016.

Genotypes	Indigenous Criteria Selection							
	Yield	Branch	Easy harvest	Root size	Root type	Plant height	Starch	Total score
UB1/2	3	2	5	3	5	4	B	20
UB1472	2	2	4	3	4	4	B, C, D	19
Adira-1	1	2	3	2	3	3	B, C	14
Malang-4	5	5	5	5	5	5	B	30
Cecekljo	3	3	4	3	5	3	C, D	21
Farsem	3	2	3	2	4	3	B, C	18
Gajab	2	3	2	3	2	2	B	14
Kejab	3	2	3	3	3	3	B	17
Caspro	4	3	4	3	4	4	B	22
Malaysia	4	4	4	4	4	4	B, C	24
Adira-4	4	3	4	4	4	3	C, D	22
Cikaret	3	4	3	3	3	4	C	20

Note: score from 1 to 5 indicating 1 = very bad, 2 = bad, 3 = moderate, 4 = good, and 5 = very good.

Starch content based on factory criteria October 26, 2016 A = 22%, B = 18%, C = 14% and D = 10%.





**Coordination before Household survey**



**Household survey in Porsea,  
Toba Samosir (2016)**



**Field day in 2016**



During the field day women are involved



Varieties selected with high yield orientation



- Fertilizer trial**

Treatments	Field application
1. Farmer practices with 200 kg Phonska/ha.	1. Applied with 200 kg Phonska/ha
2. Amount of 80 kg N + 30 kg P <sub>2</sub> O <sub>5</sub> + 80 kg K <sub>2</sub> O/ha	2. Phonska 200 kg + 125 kg Urea + 125 kg KCl/ha
3. As no 1 + 5 t/ha manure	3. Phonska 200 kg + 5 t manure/ha
4. Amount of 10 t/ha manure	4. Manure 10 t/ha
5. Amount of 40 kg N + 30 kg P <sub>2</sub> O <sub>5</sub> + 40 kg K <sub>2</sub> O/ha	5. Phonska 200 kg + 25 kg Urea + 50 kg KCl/ha
6. Amount of 40 kg N + 30 kg P <sub>2</sub> O <sub>5</sub>	6. Applied 100 kg Urea + 100 kg SP-36/ha
7. Amount of 80 kg N + 30 kg P <sub>2</sub> O <sub>5</sub>	7. Applied 200 kg Urea + 100 kg SP-36/ha





# FERTILIZER TRIAL

Treatment	Yield	BM	Starch content (%wb)
<b>Varieties</b>			
V1	85.76	18.80	17.59
V2	66.66	18.73	17.58
F test	**	ns	ns
LSD 5%			
<b>Fertilizer</b>			
F1	78.00	18.61	17.48
F2	74.50	18.82	17.64
F3	65.67	18.77	17.61
F4	72.83	18.85	17.66
F5	89.17	18.88	17.56
F6	75.17	18.97	17.76
F7	77.00	18.50	17.39
F test	ns	ns	ns
LSD 5%			

Combinations	Yield	BM	Starch content (%wb)
V1F1	86.67	18.63	17.49
V1F2	87.67	18.39	17.31
V1F3	74.33	18.73	17.57
V1F4	90.67	18.70	17.55
V1F5	82.00	19.17	17.66
V1F6	87.33	18.97	17.76
V1F7	91.67	19.03	17.80
V2F1	69.33	18.59	17.47
V2F2	61.33	19.26	17.98
V2F3	57.00	18.81	17.64
V2F4	55.00	19.88	17.78
V2F5	96.33	18.59	17.46
V2F6	63.00	18.96	17.76
V2F7	62.33	17.97	16.98
Grand Mean	76.05	18.77	17.59
CV (%)	30.37	2.00	1.46
F test	ns	**	**
LSD 5%			

**V1 Malang4 and V2 is Malaysia  
Yield 60.84 t/ha**



# EXAMPLE OF ECONOMIC ANALYSIS

## REORDERING OF TREATMENTS BASED ON COST

Field application	Total Costs	Net benefit Malang4	MRR	Net benefits Both varieties	MRR
1.Applied with 200 kg Phonska/ha	580,000	39,864,444		35,820,000	
6.Applied 100 kg Urea + 100 kg SP-36/ha	750,000	40,005,556	0.83	34,327,778D	
5.Phonska 200 kg +25 kg Urea + 50 kg KCl/ha	882,500	37,384,167D		40,728,611	16.2
7.Applied 200 kg Urea + 100 kg SP-36/ha	960,000	41,817,778	5.14	34,973,333D	
2.Phonska 200 kg + 125 kg Urea + 125 kg KCl/ha	1,467,500	39,443,611D		33,299,167D	
3.Phonska 200 kg + 5 t manure/ha	9,080,000	25,608,889D		21,564,444D	
4.Manure 10 t/ha	17,000,000	25,311,111D		16,988,889D	

**Don't make farmer recommendation based on 1 year in 1 site**

18



- **Continuation 2018**

Treatments	Field application
1. Farmer practices with 45 kg N + 45 kg P <sub>2</sub> O <sub>5</sub> + 45 kg K <sub>2</sub> O/ha.	1. Applied with 300 kg Phonska/ha
2. Amount of 90 kg N + 30 kg P <sub>2</sub> O <sub>5</sub> + 30 kg K <sub>2</sub> O/ha.	2. Phonska 300 kg + 100 kg Urea/ha
3. Amount of 45 kg N + 30 kg P <sub>2</sub> O <sub>5</sub> + 105 kg K <sub>2</sub> O	3. Phonska 300 kg + 100 kg KCl/ha
4. Amount of 60 kg N + 60 kg P <sub>2</sub> O <sub>5</sub> + 60 kg K <sub>2</sub> O/ha	4. Phonska 400 kg
5. Only organic compound 10 t/ha	5. Animal dunk 10 t/ha



## ➤ Intercropping of cassava

- During harvest of both associate crops, peanut and maize farmers very interest to know.
- Corn as well as peanut were planted in between of cassava under intercropping. The results were very good, maize attained yield up to 4.25 t/ha and peanut pod yielded Hipoma1 was able to attain 3.53 t/ha as well as Talam1 3.57 t/ha respectively.
- By inserting peanut into cassava intercropping an additional income at Rp 31,500,000 could be attained. Based on this results Pak Turisno trader coordinator try to prepare land for development further. Of the total 28 farmers attended field day during harvesting the harvesting the maize intercrops. About 20 of them agreed to practice the introduced maize intercropping system.



# Planting equipment 5 rows of peanut

- Seed of peanut are fill into box then pull by man or mini tractor.
- Very efficient due to lack of human labor.
- Field has to be weed free for obtaining high yield.



# Intercropping cassava with peanut

Cassava price drop so low only Rp 575/kg, and cassava intercropped with peanut 3,57 t/ha, considered very good.

- Then to realize in large area..????



# Multiplication

- Turisno with farmers surrounding areas 4.5 ha in Siantar
- Boru Sirait intercropping with maize 1.5 ha in Tiga Dolok
- Sitorus in Tobasa
- Muklis starting planting with only 5 cutting of Malang4 and now >3000 ha.
- Choki
- Kuantan Singingi Riau who grows 2 ha of Adira1 from Bumi Sari Prima

23



# Evaluation of 6 cassava genotypes to 4 harvesting period

- Based on selection of 12 genotypes furthermore 6 genotypes are continuing for advance evaluation in relation with harvesting periods, namely 8 months, 10 months, 12 months and 14 months. Strip plot design with three replications is applied to run this experiment. Vertical factor is six genotypes, namely:
- Malang-4, Caspro, UB1472, UB1/2, Adira-1 and Farsem.
- Horizontal factor is four harvesting periods namely 8 months, 10 months, 12 months and 14 months. The plant spacing is 100 cm x 100 cm. In every harvest period two rows of cassava at 10 plants will be harvested with remaining a row as border in every plot. Plot size is 13 m x 7 m or 13 rows with 7 plants in each row.

24





# • Conclusion

- In North Sumatera, among the introduced varieties, Malang 4 indicated the highest yield, almost reached 50 t/ha, than followed by Faroka (41 t/ha), UB ½ ( 38 t/ha), and UB 1472 (35 t/ha).
- It was surprise that Gajah variety produced only 31 t/ha. In its origin location (East Kalimantan) this variety can produce more than 10 kg/plant (if the plant spacing is 1 x 1 m is equal to 100 t/ha).



- **Ketan an introduced variety from Malang for human consumption was the lowest one, only yielded 20.57 t/ha. The reason of poor yield in Ketan was due to mainly many root rot suffering. In Malang, Ketan is mostly planted by farmers in upland at higher altitude with very good drainage.**
- **While in site of trial at Siantar with higher rainfall as well as humidity, Ketan to be susceptible to root rot and ultimately yield is reduced due to many rotten roots were separately removed. The serious of root rot incident may cause by the lower soil pH ranging from 4.3 to 4.5, although during the harvest period by pH measurement kit indicated pH around 5 however data from laboratory seems more accurate.**

26



- From fertilizer trial indicated Malang4 better than Malaysia. At fertilizer apply of 40 kg N + 30 kg P<sub>2</sub>O<sub>5</sub> + 40 kg K<sub>2</sub>O/ha. Therefore still need to repeat with five treatments.
- From 6 varietal evaluation with 4 harvesting periods indicated that Caspro, UB1472 and UB1/2 very susceptible to root rot especially when harvested in 12 and 14 months. Farsem and Adira1 is the best, and also very poor reaction to rot to be harvested in 12 and 14 months. Malang4
- Intercropping with maize after maize harvest grow peanut.

27



**THANK YOU FOR YOUR ATTENTION**



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