Cassava Agronomy Research Activities in Daklak

"Developing value-chain linkages to improve smallholder cassava production systems in Vietnam and Indonesia"

Tay Nguyen University Components




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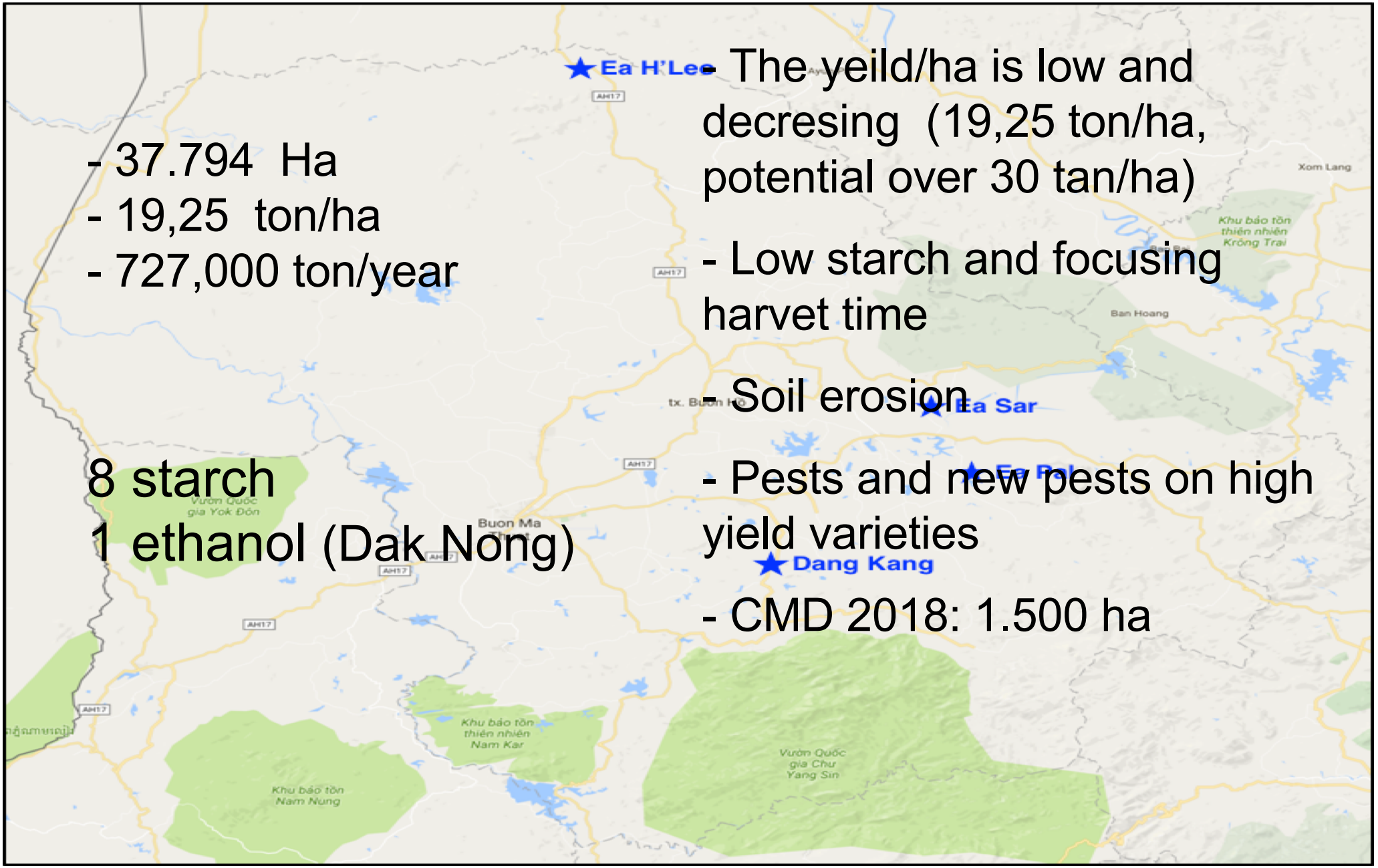
Introduction



- 37.794 Ha
- 19,25 ton/ha
- 727,000 ton/year

8 starch
1 ethanol (Dak Nong)

- The yeild/ha is low and decresing (19,25 ton/ha, potential over 30 tan/ha)
- Low starch and focusing harvet time
- Soil erosion
- Pests and new pests on high yield varieties
- CMD 2018: 1.500 ha

Component 2: Improve technology in cassava production chain

- Varieties evaluation trials (2017)

- Fertilizer and density experiment on KM419 (2017)

- Fertilizer and density experiment on HLS11 (2018)

- Intercrop trials 2018

Chukty commune - Krong Bong District 2018

Agronomic activities 2018 - 2019

Select the best from varieties evaluation in 2017: HLS11

Rayong: 36/24

HLS10: 42/30

HLS11: 45/31

KM 419: 45/31ton

KM 505: 38/25 ton/ha

KM 140: 36/26 ton/ha

I.TRIALS: 1. DENSITY AND FERTILIZER ON HLS11 ON ACRISOL IN KRONGBONG

- Density: 3 treatments

* M1: (1,0m x 1,0m); 10,000 plants/ha
* M2: (1,0m x 0,8m); 12,500 plants/ha (control)
* M3: (0,8m x 0,8m); 15.625 plants/ha

- Fertlizer: 6 treatments

* P0: No fertilizer
* P1: 250 kg NPK 15:5:20 + 100 kg Van Dien Phospherous fertilizer
* P2: 81 kg N + 54 kg P_2O_5 + 81 kg K_2O (reduction 10% off P3
* P3: 90 kg N + 60 kg P_2O_5 + 90 kg K_2O (control)
* P4: 90 kg N + 60 kg P_2O_5 + 90 kg K_2O (control) + 1 ton biofertilizer
* P5: 108 kg N + 72 kg P_2O_5+ 108 kg K_2O (20% increase of P3

Implementing density and Fertilizer experiment on HLS11 Chưkty commune 2018-2019

Table 1.1. Soil analysis

Treatments	Monitoring indicators				
	N_{ts} (%)	P_2O_{5dt} (mg/100g soil)	K_2O_{dt} (mg/100g soil)	Ca^{2+} (lđl/100g soil)	Mg^{2+} (lđl/100g soil)
Before treatments	0,11	2,19	9,18	0,49	0,10
P0	0,04	1,35	5,87	0,32	0,05
P1	0,08	1,86	7,98	0,34	0,07
P2	0,08	1,91	8,14	0,35	0,08
P3(control)	0,09	1,98	**9,54**	**0,51**	0,09
P4	**0,11**	**2,18**	**9,31**	**0,52**	**0,10**
P5	**0,12**	2,14	**9,36**	**0,55**	0,08

Table 1.2 Effect of density and fertilizer dose to fresh root yield on HLS11 (ton/ha)

Fertilizer (P)	Density (M)			Average (P)
	M1 (10.000 plant/ha)	M2 (12.500 plant/ha)	M3 (15.625 plant/ha)	
P0	11,95^{f}	12,98^{ef}	13,02^{ef}	12,65^{C}
P1	16,99^{def}	17,93^{def}	18,41^{cdef}	17,78^{C}
P2	23,11^{bcdef}	24,83^{abcdef}	25,74^{abcde}	24,56^{B}
P3 (c)	26,22^{abcde}	26,76^{abcd}	27,42^{abcd}	26,80^{B}
P4	34,12^{ab}	**37,35^{a}**	32,20^{ab}	**34,55^{A}**
P5	32,97^{ab}	**36,19^{ab}**	31,88^{abc}	33,68^{A}
Average (M)	24,23^{A}	**26,00^{A}**	24,78^{A}	

CV%: 35,47

Remarks: different characters show different statistic significant with p=0.05

Tabe 1.3. Economic effect against different density and fertilizer quantity on HLS11

Treatment	Fresh root yield (tấn/ha)	Price (Mill VND/ton)	Total income (Mill VND/ton)	Total cost (Mill VND/ton)	Profit (Mill VND/ton)
M1P0	11.95	2.50	29.88	24.00	5.88
M1P1	16.99	2.50	42.49	28.25	14.24
M1P2	23.11	2.50	57.77	30.32	27.45
M1P3	26.22	2.50	65.54	32.35	33.19
M1P4	34.12	2.50	85.31	37.85	**47.46**
M1P5	32.97	2.50	82.42	34.82	**47.60**
M2P0	12.98	2.50	32.45	25.50	6.95
M2P1	17.93	2.50	44.83	29.75	15.08
M2P2	24.83	2.50	62.07	31.82	30.25
M2P3	26.76	2.50	66.89	33.85	33.04
M2P4	37.35	2.50	93.36	39.35	**54.01**
M2P5	36.19	2.50	90.47	36.32	**54.15**
M3P0	13.02	2.50	32.54	27.38	5.16
M3P1	18.41	2.50	46.03	31.63	14.40
M3P2	25.74	2.50	64.35	33.69	30.66
M3P3	27.42	2.50	68.56	35.73	32.83
M3P4	32.20	2.50	80.49	41.23	39.26
M3P5	31.88	2.50	79.71	38.20	41.51

2.TRIALS: Intercroping with legue on acrisol in KrongBong

- CT1 - HLS11/KM419 only
- CT2 - HLS11/KM419 + red bean
- CT3 - HLS11/KM419 + cowpea
- CT4 - HLS11/KM419 + munbean
- CT5 - HLS11/KM419 + peanuts

- Spacing cassava: 1,0m x 1,0m (10.000 plants/ha)

- Fertilizer for cassava: 90 kg N + 60 kg P_2O_5 + 90 kg K_2O, (195 kg urea + 400 kg phospherous + 150 kg potassium fertilizer (MARD standard), each plant applied: 19.5g urea + 40g phospherous + 15g potassium

- Fertilizer for legume per hecta only legume: 1 ton bio fertiizer + 400 Cao + 75 kg Urea + 150 Phospherous + 100 KCL

- Cassava block: 40m^2 with ridges to avoid water logged. Two row legumes between two cassav rows. Each ridge 3 cassava rows. Legume spacing 30x20cm=200 legume plants/block. Total 30 blocks. Each blocks=40m^2 =1.200m^2 intercrop with legume.

Implementing intercropping with HLS11 Chưkty commune 2018-2019

Table 2.1a Soil analysis

Treatments	Monitoring indicator		
	N_{ts} (%)	P_2O_{5dt} (mg/100g soil)	K_2O_{dt} (mg/100g soil)
Before treatments	0,11	2,19	9,18
HLS11 only	0,09	1,98	9,54
HLS11 + red bean	0,14	1,54	12,03
HLS11 + cow pea	0,13	2,44	11,98
HLS11 + mungbean	0,15	2,58	12,14
HLS11 + peanut	0,12	2,37	10,87

Table 2.1b Soil analysis

Treatments	Monitoring indicator		
	Ca^{2+} (lđl/100g soil)	Mg^{2+} (lđl/100g soil)	Organic matters (%)
Before the treatments	0,49	0,10	1,02
HLS11 only	0,29	0,08	0,97
HLS11 + Red beans	0,54	0,14	1,23
HLS11 + Cowpea	0,53	0,14	1,19
HLS11 + Mungbean	0,55	0,15	1,14
HLS11 + Peanut	0,52	0,13	1,13

Table 2.2 Cassava root yield, cassava dried chips and starch yield

Treatments	Monitoring indicators		
	Fresh root yield (ton/ha)	Dried chip yield (ton/ha)	Starch yield (ton/ha)
HLS11 only	23,33[b]	11,67[b]	6,91[b]
HLS11 + Red bean	**27,47[a]**	13,74[a]	8,32[a]
HLS11 + Cow pea	**27,40[a]**	13,70[a]	8,31[a]
HLS11 + Mungbean	25,07[ab]	12,54[ab]	7,51[ab]
HLS11 + Peanut	26,73[ab]	13,22[a]	8,03[a]
CV%	7,59	7,10	8,30

Remarks: different characters show different statistic significant with p=0.05

Table 2.3 Total profit in 1ha HLS11 intercroped with peanuts

Treatments	Fresh root yield (ton/ha)	Unit price (mill VND/ton)	Total income (mill VND/ha)	Total cost (mill VND/ha)	Profit (mill VND/ha)
CT1. HLS11 only	23,33	2.5	58.33	30.35	27.98
CT2. HLS11+ Red bean	27,47	2.5	68.67	30.35	**38.32**
CT3. HLS11+ cow pea	27,40	2.5	68.50	30.35	**38.15**
CT4. HLS11+ mungbean	25,07	2.5	62.67	30.35	32.32
CT5. HLS11+ peanut	26,73	2.5	66.83	30.35	36.48

Table 2.4 Total profit from intercropped legume with HLS11 (actual)

Legume	Yield (kg/block/ 40m^2 Intercropped with cassava)	Yield (kg/ha)	Price (1.000VND/ kg)	Total income (mill VND/ha)	Total cost (mill VND/ha)	Profit (mill VND/ha)
Red bean	5,58	462	35	16.18	5.14	11.04
Cow pea	5,33	444	35	15.54	5.15	10.39
Mungbean	4,26	355	30	10.66	5.23	5.43
Peanut	7,62	635	28	17.78	5.55	**12.23**

Table 2.5 Total profit from HLS11 intercropped with legumes in KrongBong 2018

Treatment	Profit from cassava (mill VND/ha)	Profit from legume (mill/ha)	Total profit (mill/ha)
CT1. HLS11 only	27.98	-	27.98
CT2. HLS11 + red bean	38.32	11.04	**49.36**
CT3. HLS11 + cow pea	38.15	10.39	**48.54**
CT4. HLS11 + mungbean	32.32	5.43	37.45
CT5.HLS11+ peanut	36.48	12.23	**48.71**

Implementing intercropping with KM 419 Chưkty commune 2018-2019

Table 3.2 Fresh root yield, dried chips and starch yield

Treatment	Monitoring indicator		
	Fesh root yield (ton/ha)	Starch yield (ton/ha)	Dried chip yield (ton/ha)
KM419 only	25,90^{b}	7,44^{b}	13,56^{a}
KM419 + red bean	**33,77^{a}**	10,04^{a}	16,51^{a}
KM419+ cowpea	**31,70^{ab}**	9,38^{ab}	16,17^{a}
KM419 + mungbean	29,067^{ab}	8,46^{ab}	15,06^{a}
KM419 + peanut	**30,50^{ab}**	8,95^{ab}	14,63^{a}
CV%	11,96	12,50	11,33

Remarks: different characters show different statistic significant with p=0.05

Table 3.3 Total profit of 1ha KM419 in Krong Bong in 2018

Treatment	Fresh root yield (ton/ha)	price (mill VND/ton)	Total income (Mill VND)	Total cost (Mill VND)	Profit from cassava (Mill VND)
CT1. KM419 only	25,90	2,5	64,75	30,35	34,40
CT2. KM419 + Red bean	33,77	2,5	84,42	30,35	**54,07**
CT3. KM419 + cow pea	31,70	2,5	79,25	30,35	48,90
CT4. KM419 + mungbean	29,07	2,5	72,67	30,35	42,32
CT5. KM419 + peanut	30,50	2,5	76,25	30,35	45,90

Table 3.4 Total profit from legume intercropped with KM 419 (actual)

Legume	yield (kg/block/40m^2 intercrop with cassava)	Yield (kg/ha)	Unit price (1.000 VND/kg	Total income (Mill VND)	Total cost (Mill VND)	Profit (Mill VND)
Red bean	5,66	471	35	16,49	5,69	10,80
Cowpea	5,43	542	35	18,97	5,91	13,06
ungbean	4,39	366	30	10,98	5,97	5,01
Peanut	8,16	680	28	19,04	6,61	12,43

Table 3.5 Total profit from legume intercrop with KM419 in Krongbong in 2018

Treatment	Profit from cassava (Mill VND/ha)	Profit from legume (Mill VND/ha)	Total profit (Mill VND/ha)
CT1.KM419 only	34,40	-	34,40
CT2.KM419+ Red bean	54,07	10,08	**64,15**
CT3.KM419+ Cow pea	48,90	13,06	**61,96**
CT4.KM419+ Mungbean	42,32	5,01	47,38
CT5.KM419+ Peanut	45,90	12,43	58,33

4.TRIALS: INDIVIDUAL EVALUATION OF 21 ELITE CASSAVA CLONES FROM CIAT

Table: Fresh root yield and starch content of 21 elite CIAT cassava clones

S/No	Code	Name of clones	Root yield (ton/ha)	Starch yield (ton/ha)
1	A1-28	SM 1127 -8	40.96^{hi}	28.50^{abc}
2	A2-33	SM 1669 - 5	16.04^{j}	30.00^{a}
3	A3-42	GM 1171 -15	27.42^{ij}	24.50^{f}
4	A4-54	SM 3351 -13	53.46^{gh}	25.47^{ef}
5	A5-31	SM 1521 - 10	28.67^{ij}	29.00^{ab}
6	A6 -43T	GM 1174 -5 (WHITE)	42.88^{hi}	29.50^{a}
7	A7-44	GM 1174 - 13	40.63^{hi}	26.50^{cdef}
8	A8-16	SM 3140 - 2	77.83^{ef}	30.00^{a}
9	A9-35	SM 2192 - 6	52.33^{gh}	26.50^{cdef}
10	B1-24	GM 1263 - 6	15.63^{j}	30.00^{a}
11	B2-22T	GM 214 -62	120.92^{cd}	25.00^{ef}

S/No	Code	Name of clones	Root yield (ton/ha)	Starch yield (ton/ha)
12	B3-30	SM 1511 -6	109.17^{d}	30.00^{a}
13	B4-43N	GM 1174 -5 (BROWN)	88.88^{e}	28.97^{ab}
14	**B5-39**	**GM 957 - 11**	**139.92^{b}**	**28.00^{abcd}**
15	**B6-27N**	**GM 1419 - 40**	**125.71^{bcd}**	**30.00^{a}**
16	B7-26	GM 1406 - 13	16.79^{j}	27.00^{bcde}
17	B8-4	GM 3732 -22	76.63^{ef}	27.00^{bcde}
18	B9-40	GM 971 - 2	51.75^{gh}	29.00^{ab}
19	C1-49	GM 1491 - 9	65.50^{fg}	26.00^{def}
20	**C2-10**	**GM 579 - 13**	**157.50^{a}**	**30.00^{a}**
21	**C3-41**	**GM 1170 -22**	**128.67^{bc}**	**28.60^{abc}**

Varieties Evaluation Experiments: 21 varieties from CIAT in Ferrasols in Eatu commune - BMT city

FIELD DAY:

- DENSITY AND FERTILIZER ON HLS11

- HLS11 INTERCROP WITH LEGUME

- KM419 INTERCROP WITH LEGUME

IV. STUDENTS

1. Master degree students graduated by 31 May 2019
+ 03 Master on crop science:
- Reseach on density and fertilizer on KM419 on acrosol in KrongBong district, Daklak province
- Evaluation of potential cassava varietiesin KrongBong Daklak
- Reseach on density and fertilizer on KM419 on acrisol in Easar, Eakar, Daklak

2. 11 Bachelor students

IV. STUDENTS

IV. STUDENTS

B. Experiments in 2019

1. **Evaluation of CMD and witches broom tolerance of elite cassava clones:**
   - HLS11, HLS12 and HLS14
2. **IPM demonstration: HLS11, HLS12, HLS14**
   - Density, fertilizer, intercrop and pest and disease monitoring
3. **Standard evaluation of 21 CIAT Elite clones. Control varieties: KM94 (KU50) and KM419**
4. Clean planting material production trial with farmer

- Farmer's investment with technical assistance from the project

5. Clean planting material production trial with factory

- Factory invests. Project provide technical assistance when required

B. Plan (5.2019 -2020)

6. STUDENTs

Master degree graduated in 2020

1. 3 Master degree on crop science

2. Bachelor students, crop science faculty graduate in 2020: 20 students

THANKS FOR YOUR ATTENTION