

# **Agronomic result and economic analysis in Myanmar**

**Nilar Aung, Kyaw Thura, Thant Lwin Oo, Dominic Smith,  
Jonathan Newby, and Tin Maung Aye**

# Introduction

- ❑ Cassava was introduced to Myanmar in the middle of the 19th century and first grown in the coastal and delta regions as a food crop.
- ❑ Cassava is now mainly grown for industrial uses and becomes a cash crop for many upland farmers. This crop is still a neglected crop compared to that of other economic crops in the country.
- ❑ More recently, the cassava planted areas has markedly increased due to market demand while average yield of cassava is low due to lack of high-yielding varieties and appropriate agronomic practices.
- ❑ Recently this crop is grown in all parts of the country, mainly in Ayeyarwady , Bago, Tanintharyi, Yagon regions and Kachin state. Especially in the uplands of Ayeyarwady region many smallholder farmers like to grow more cassava than other crops.



# Cassava area, yield and production in Myanmar (2017/2018)

Region/State	Harvested Area ( ha)	Average Yield (t/ha)	Production (t)
Ayeyarwady	12919	14.87	192050
Bago	185	20.25	3746
Chin	86	4.15	357
Kachin	16651	9.2	153158
Kayah	-	-	-
Kayin	951	13.31	12654
Magway	-	-	-
Mandalay	41	11.15	457
Mon	295	14.39	4245
Rakhine	316	6.25	1975
Sagaing	1641	8.58	14073
Shan	316	7.61	2404
Tanintharyi	715	12.81	9156
Yangon	602	18.49	11129
<b>Total</b>	<b>34718</b>	<b>11.68</b>	<b>405404</b>

# Methods and Design



- ❑ Ayeyarwady region is Myanmar's most populated region with an estimated population of 6.32 million (about 88% of people living in rural areas).
- ❑ This region covers a total area of 35,964 km<sup>2</sup> and consists of 6 districts with 26 townships.
- ❑ It has tropical climate with three seasons (hot season, rainy season, cold and dry season).
- ❑ The temperature rises above 33 degree C during the hot season and, average 21 degree C during the cold season.
- ❑ The mean annual precipitation is about 3,000 mm with 82% average relative humidity.

# Cassava research project area and type of demonstration trials



- ❑ After consultations with regional DOA officers and village leaders, three townships (Hinthada township and Lemyethna township and Kyonpyaw township) were selected in major cassava growing districts of Pathein and Hinthada
  
- ❑ Three types of cassava demonstration trials were conducted in 2018/2019 growing season:
  - 1) Planting methods;
  - 2) Balanced fertilizer application;
  - 3) Multiplication of good planting materials.

# Results



- The five farmer trials of planting methods and balanced fertilizer application were harvested and measured fresh root yield and starch content % at 8 months after planting

# *Planting method demonstration trials*

Treatments:

1. Ridge planting method
2. Mount planting method

Cassava variety: Malaysia





***Fresh root yield and  
starch content  
measurement in the field***





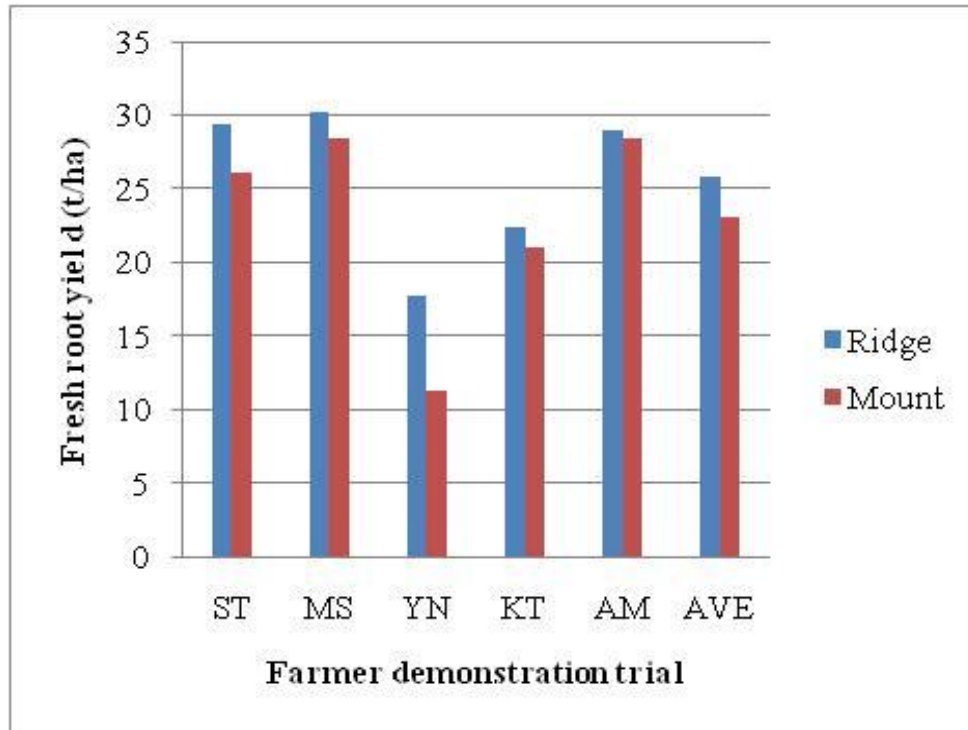
## ***Results of planting method demonstration trials in Hinthada township (2018/2019)***

Planting Method	Fresh Root Yield (t/ha)						Starch content (%)					
	ST	MS	YN	KT	AM	Ave	ST	MS	YN	KT	AM	Ave
<b>Ridge</b>	29	30	18	22	29	26	31.1	31.1	34.0	31.1	33.2	32.1
<b>Mount</b>	26	28	11	21	28	23	31.1	31.1	31.1	31.1	33.2	31.5

□ The results from the trials of planting methods showed that **the ridge method produced higher yields** (average root yield 26 t/ha), while **traditional mount method produced lower yields** (average root yield 23 t/ha)

□ There was a difference in root yields between ridge method and mount method although the root yields varied among five farmer plots in same method

## ***Results of planting method demonstration trials in Hinthada township (2018/2019)***



❑ The results from the trials of planting methods showed that **the ridge method produced higher yields** (average root yield 26 t/ha), while **traditional mount method produced lower yields** (average root yield 23 t/ha)

❑ There was a difference in root yields between ridge method and mount method although the root yields varied among five farmer plots in same method

*Comparing the root yields of five farmers between ridge method and mount method*

## ***Effect of different planting methods on yield and starch content as well as production cost and net income***

<b>Planting Method</b>	<b>Fresh Root Yield (t/ha)</b>	<b>Starch Content (%)</b>	<b>Gross Income (kyat/ha)</b>	<b>Production Cost (kyat/ha)</b>	<b>Net Income (kyat/ha)</b>
Ridge	26	32.1	3,309,000	692,000	2,617,000
Mount	23	31.5	2,961,000	807,000	2,154,000

- The production costs for traditional mount method (807,500 kyat per ha) were higher than introduced ridge method (692,250 kyat per ha)
- Estimated net incomes from mount method was 2,154,000 kyat/ha compared to the ridge method was 2,617,000 kyat/ha
- The ridge method gave lower production cost and thus more net income (463,000 kyat/ha) than mount method

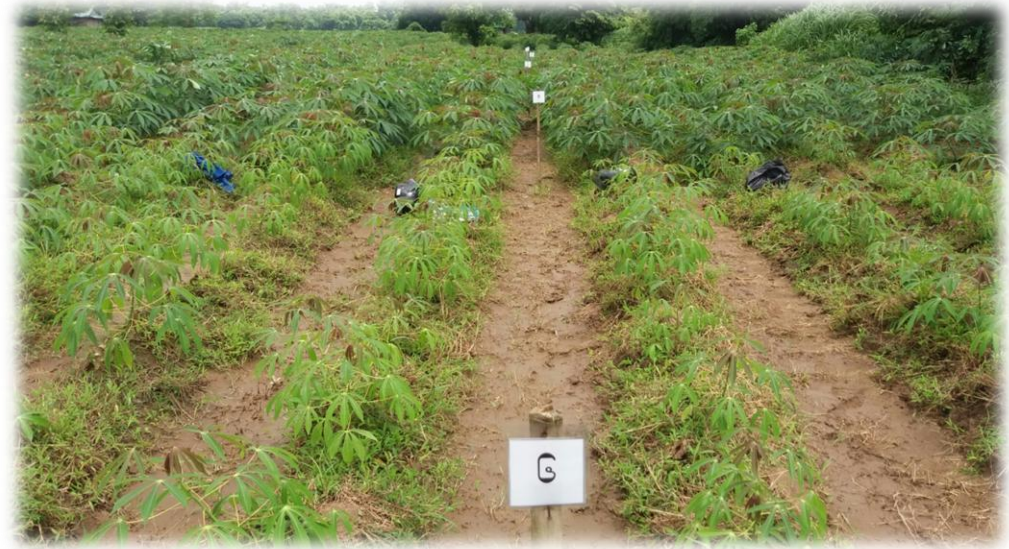
# Advantages of ridge method

- ❑ When cassava is grown on ridges, the number of plants per unit area, and sometimes yield per plant, are higher than for a crop raised on mounts.
- ❑ One of the advantages of ridge method is that farmers can save time as ridges can be made by tractors.
- ❑ Introduced ridge method also requires less labour, fertilizer is easier to apply and controlling weeds is also easier compared to traditional mount method.

# Fertilizer demonstration trials



- The fertilizer treatments (variety Malaysia):
1. Balanced NPK High (100kg of Urea+50kg of TSP+100kg of KCl/ac)
  2. Balanced NPK Low (50kg of Urea+25kg of TSP+50kg of KCl/ac)
  3. Balanced NPK Low plus Manure (50kg of Urea+25kg of TSP+50kg of KCl + FYM 2t/ac)
  4. NP Low without K (50kg of Urea+25kg of TSP /ac)
  5. Farmers' practice (75kg of Urea per ac)
  6. Control (No fertilizer application)



# Results of the fertilizer trials in 2018/2019

Treatment	Fresh Root Yield (t/ha)						Starch content (%)						Starch Yield (t/ha)
	F1	F2	F3	F4	F5	Ave	F1	F2	F3	F4	F5	Ave	Ave
NPK High rate	30	27	30	21	37	29 <sup>a</sup>	31	31	35	31	31	32 <sup>a</sup>	8.9 <sup>a</sup>
NPK Low rate	20	22	27	22	45	27 <sup>ab</sup>	31	31	31	31	31	31 <sup>a</sup>	8.4 <sup>a</sup>
NPK Low rate + FYM	23	22	26	27	40	28 <sup>ab</sup>	33	29	31	31	31	31 <sup>a</sup>	8.6 <sup>a</sup>
NP Low rate without K	22	16	19	21	46	25 <sup>ab</sup>	31	31	31	31	29	31 <sup>a</sup>	7.2 <sup>ab</sup>
Farmers' practice	27	15	20	23	25	22 <sup>b</sup>	29	31	29	29	27	29 <sup>b</sup>	5.8 <sup>b</sup>
No fertilizer	13	7	4	6	20	10 <sup>c</sup>	31	29	27	27	27	28 <sup>b</sup>	2.6 <sup>c</sup>

Note: In the same column, the means followed by different small letters are significantly different.

- ❑ The results of fertilizer trials (F1, F2, F3, F4 and F5) indicated that all fertilizers (ie. mineral fertilizers and FYM) greatly increase root yields and root starch content
- ❑ Highest root yields and starch content were obtained when applied at balanced NPK high rate (110 kg of N, 55 kg of P<sub>2</sub>O<sub>5</sub>, 150 kg of K<sub>2</sub>O per ha)
- ❑ The response of cassava to fertilizers varies from place to place, and increasing the rate of NPK fertilizers did not always increase the root yields

# Discussions of the results of fertilizer trials

- ❑ Combination with mineral fertilizers and FYM also improved the yields and starch content
- ❑ However, only urea application produced markedly less starch yield than other mineral fertilizer applications
- ❑ The trial results can be concluded that deficiency of particular essential minerals (i.e. N, P, K) reduce both quantity and quality of cassava roots, and balanced fertilizer application is one of the most effective ways to increase fresh root and starch yields, and net income
- ❑ The optimum fertilization rates for specific locations is still lacking as cassava crop response to fertilization depends on an individual variety, soil chemical and physical characteristics, micro-climatic conditions and other crop management practices such as weeding

## ***Return on investment of fertilizers (Calculated from fertilizer demonstration trials)***

Price of fresh roots = 128,520 kyat/t					
<b>Fertilizer treatment</b>	<b>Fertilizer cost (kyat)</b>	<b>Yield (t/ha) 2018/19</b>	<b>Gross sales (kyat)</b>	<b>Kyat increase from fertilizer</b>	<b>Return on investment</b>
NPK High rate	288,990	29	3,694,179	2,433,655	7.4
NPK Low rate	144,495	27	3,482,121	2,221,597	14.4
NPK Low rate + FYM	274,911	28	3,571,571	2,311,047	7.4
NP Low rate without K	83,980	25	3,213,257	1,952,733	22.3
Farmers' practice	88,920	22	2,794,025	1,533,501	16.2
No fertilizer	0	10	1,260,524	0	

- The balanced fertilizer application is one of the most effective ways to increase not only the yields but also to increase farmers' net income
- Therefore farmers who follow intensive cultivating system may be encouraging to apply optimum inputs such as fertilizers in cultivation
- Given this scenario, it is likely that smallholder farmers who generally practice a traditional non-intensive, low input system of cultivation will adopt improved agronomic practices in next growing season



# *Farmer field day at the harvest of cassava demonstration trials*



# Conclusions & suggestions



- ❑ Stimulating sustainable intensification of cassava production can help improve the socio-economic conditions of Myanmar farmers in rural areas
- ❑ However, slow adoption of suitable varieties and good agronomic practices are challenges for scaling of the trial results
- ❑ To speed up the adoption of sustainable production technologies, field demonstrations should be collaborated with local processors, cassava traders as well as agro-input dealers
- ❑ Strengthening effective R&D activities and training for project beneficiaries are also needed urgently

# Conclusions & suggestions



- ❑ Stimulating sustainable intensification of cassava production can help improve the socio-economic conditions of Myanmar farmers in rural areas.
- ❑ However, slow adoption of suitable varieties and good agronomic practices are challenges for scaling of the trial results.
- ❑ To speed up the adoption of sustainable production technologies, field demonstrations should be collaborated with local processors, cassava traders as well as agro-input dealers.
- ❑ Strengthening effective R&D activities and training for project beneficiaries are also needed urgently.

# Thank you!



**ACIAR**



THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA

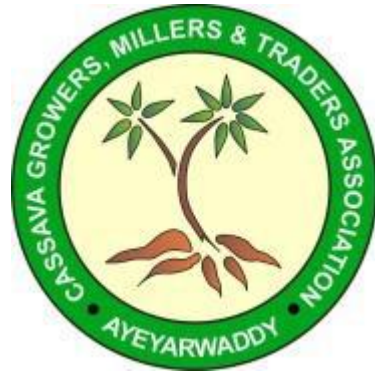


**CIAT**

DEPARTMENT OF AGRICULTURE  
**DOA**  
MYANMAR



**Yezin, Myanmar**



Thanks also to U Tin Hlaing (DoA retired)