Current Cassava Research for Development in Myanmar

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Background Information

Myanmar

Geography

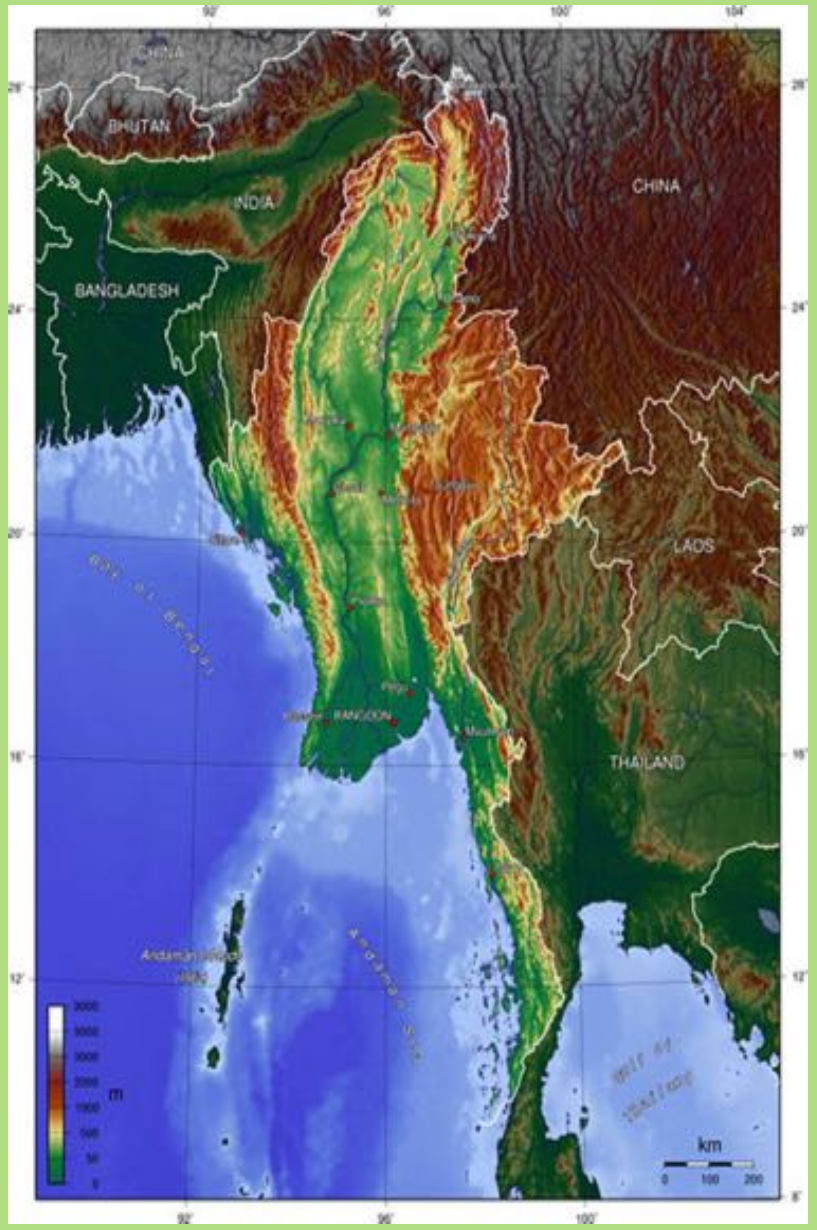
- N 9º 58’ to 28º 29’
- E 92º 10’ to 101º 10’
- Mountainous country with plateaus, valleys and plains

Land frontier

- with Bangladesh 272 km
- with China 2227 km
- with India 1453 km
- with Laos 235 km
- with Thailand 2099 km

Total Land area

- 67.7 million hectors



Ayeyarwady Regional Geography

- N 15° 40’ to 16°20’
- E 94° 0’ to 96° 0’
- Delta area with mountains region

Climate

- Tropical monsoon with three distinct seasons
  - The hot and dry season - from mid-February to mid- May,
  - The rainy season from mid-May to mid-October and
  - The cold season from mid-October to mid-February

Land Utilization in Myanmar in 2015-2016

Particulars	mil ha	%
Net Soon Areas	12.01	17.7
Fallow Land	0.45	0.7
Cultural Waste Land	5.25	7.8
Reserved Forests	18.55	27.4
Other Forests	14.74	21.8
Others	16.66	24.6
Total	67.66	100.0

Source :DAP in 2016

Land Utilization in Ayeyarwady in 2016-2017

Particulars	'000 ha
Net Soon Areas	1944
Fallow Land	6
Cultural Waste Land	-
Reserved Forests	618
Other Forests	109
Waste Land	14
Others	813
Total	3504

Source : DALMS, Ayeyarwady region

Selected crops cultivated in Myanmar in2015/2016

Crop	Sown area (,000ha)	Yield(mt/ha)	Production ('000t)
Paddy	7212	3.97	28209
Pulses	4656	1.33	6211
Groundnut	955	1.63	1548
Cassava	36	12.92	468

Source: DAP

selected crops cultivated in Myanmar. In comparison with other major crops, Cassava sown area is relatively low and there is still potential to expand.

Selected crops cultivated in Ayeyarwady Region in 2016-2017

Crop	Sown area(ha)	Yield(t/ha)	Production (t)
Paddy	2039351	3.85	7848160
Pulses	550852	0.018	9896
Groundnut	42889	1.69	72390
Cassava	12798	14.79	189054

Source: DOA, Ayeyarwady Region

Cassava harvested area, average yield and production in Myanmar in 2016/17

Region/Stare	Harvested area (ha)	Average yield (t/ha)	Production (t)
Ayeyarwady	12,723	14.86	189,054
Bago	82	24.87	2,039
Chin	91	4.19	381
Kachin	18,620	10.02	186,481
Kayah	-	-	-
Kayin	931	12.77	11,660
Magway	-	-	-
Mandalay	41	11.44	457
Mon	277	14.36	3,977
Rakhine	313	6.24	1,953
Sagaing	1888	7.41	13,982
Shan	296	7.69	2,276
Thanintharyi	716	12.79	9,157
Yangon	647	18.49	11,961
Total	36,625	11.83	433,378

Source: DAP, 2016

the Cassava harvested area in different states and regions in 2016-17. Ayeyarwady stands at the second place after Kachin State.

Cassava Production in Ayeyarwady

What Characterize Cassava Production in Ayeyarwady Region

- Produced by small holder farmers
- Local or introduced varieties on small farms
- Usually get Low yields (2.5-16 t/ha/yr)
- Has become a cash crop to be sold for industrial use

How it sown and harvested

Piling Cassava Stems

Land preparation

Planting on Mount

- Common in traditional cassava cropping systems

- Weeding and hill up

Fertilization

- Most farmers just use N fertilizer for cassava and don’t use K fertilizer.

Harvesting

- Use hoes or pulling up by hand

Training, Workshop and Field trip

Discussion with cassava growers on improving planting methods and trying new varieties

Intercropping with corn

Popular Cassava Varieties

Popular Cassava Varieties

- *Bangkok*
- *Hinthada local (Yoe Sein and Pankalaw)*
- *Japan*
- *Mon local*
- *Malaysia*
- *Shwepyitha (Rayong 1)*
- *Singapore*
- *Shwe Li*

Variety

- MALAYSIA

Variety

- JAPAN

Variety

- SINGAPORE

Variety

- BANGKOK

Variety

- Shwe Li

Local variety

- YOE SEIN

Local Variety

- PANKALAW

Introduced Cassava Varieties


NEP

Research on Cassava Production

- Conducted in 2010 to 2017

➢ 2010 Research

- Variety Trial

➢ 2011 Research

- Variety Trial

➢ 2015 Research

- Planting Method Trial
- Fertilizer Application Trial

➢ 2016 Research

- N-P-K Fertilizer Trial
- Varietal Evaluation Trial

FPR Trial conducted in Hinthada District in 2015-2016 and 2016-2017

In 2015

1.Planting method trial

2.Fertilizer application trial

In 2016

1.N-P-K Fertilizer trial

2.Varietal evaluation trial

Planting method trials

planting methods like furrow and ridge were trialed to compare with mount, the traditional method

Fertilizer application trial

Measuring cassava starch content

Effect of Planting method trial on root production conducted at Hinthada District in Myanmar in 2015-2016

Treatments	Yield (ton/ha)				% starch content			
	Plot(1)	Plot(2)	Plot(3)	**Average**	Plot(1)	Plot(2)	Plot(3)	**Average**
1. Ridge	42.76	45.94	40.32	43.01	31.05	31.05	31.05	31.05
2. Furrow	27.05	27.55	32.03	28.88	28.94	28.94	28.94	28.94
3. Farmers' practice	23.21	20.94	30.18	24.78	31.05	31.05	31.05	31.05
Average	31.01	31.48	34.18	**32.33**	30.35	30.35	30.35	**30.35**

According to the results of planting method trial, the ridge method produced 43.01 ton/ha, the highest yield among the three methods. In terms of starch content, the ridge and the mount methods gave the same starch content and better than the furrow method.

Average result of planting method trial for root production conducted at three plots Myanmar in 2015-2016

Treatments	Fresh Root Yield (t/ha)	Root Starch Content %	Gross Income ('000) kyat/ha	Production Cost ('000) kyat/ha	Net Income ('000) kyat/ha
1. Ridge	43.01	31.05	4473	809	3663
2. Furrow	28.88	28.94	3003	733	2269
3. Farmers' Practice	24.78	31.05	2577	728	1848
Average	**32.33**	**30.35**	**3351**	**757**	**2593**

If the three methods are compared in terms of net income, the ridge method is the best and it is nearly two times of the net income using the mount method

Effect of Fertilizer application trial on root production conducted at Hinthada District in Myanmar in 2015-2016

Treatments	Yield (ton/ha)				% starch content			
	Plot(1)	Plot(2)	Plot(3)	Average	Plot(1)	Plot(2)	Plot(3)	Average
1.50KgUrea+17KgTSP/ac	34.17	36.69	28.78	**33.21**	28.94	28.94	28.94	**28.94**
2. 50KgUrea+25Kg(10:10:5)/ac	49.83	48.00	28.62	**42.15**	28.94	28.94	28.94	**28.94**
3. 50KgUrea+25KgTSP+50KgKCL/ac	37.85	34.88	33.00	**35.24**	26.83	28.94	22.62	**26.13**
4. 100KgUrea+50KgTSP+100KgKCl/ac	52.73	49.38	44.77	**48.96**	31.05	31.05	31.05	**31.05**
5.50KgUrea+25KgTSP+50KgKCl +5tFYM /ac	52.37	41.97	32.68	**42.34**	28.94	20.51	26.83	**25.43**
6.150kg Buffalo head /ac	42.35	43.50	36.97	**40.94**	28.94	28.94	28.94	**28.94**
7.50Kg:Urea+25KgTSP+50KgKCl +2to Swesone	45.37	38.89	36.97	**40.41**	28.94	28.94	31.05	**29.64**
8.Control	16.24	33.34	26.42	**25.33**	22.62	28.94	26.83	**26.13**
Average	41.36	40.83	33.53	**38.57**	28.15	28.15	28.15	**28.15**

Average result of fertilizer application trial for root production conducted at Hinthada District in Myanmar in 2015-2016

Treatments	Fresh Root Yield (t/ha)	Root Starch Content %	Gross Income ('000) kyat/ha	Production Cost ('000) kyat/ha	Net Income ('000) kyat/ha
1.50KgUrea+17KgTSP/ac	**33.21**	**28.94**	3453	677	2776
2. 50KgUrea+25Kg(10:10:5)/ac	**42.15**	**28.94**	4383	712	3671
3. 50KgUrea+25KgTSP+50KgKCl/ac	**35.24**	**26.13**	3664	801	2863
4. 100KgUrea+50KgTSP+100KgKCl/ac	**48.96**	**31.05**	5091	1068	4023
5.50KgUrea+25KgTSP+50KgKCl +5tFYM /ac	**42.34**	**25.43**	4403	812	3591
6.150kg Buffalo head /ac	**40.94**	**28.94**	4257	700	3557
7.50Kg:Urea+25KgTSP+50KgKCl +2ton Swesone	**40.41**	**29.64**	4202	868	3334
8.Control	**25.33**	**26.13**	2634	558	2076
Average	**38.57**	**28.15**	4010	774	3236

Urea(46%)
TSP(46%P2O5)
KCl(60%K2O)
Buffalo(16: 6:19)

Effect of Fertilizer application trial on root production conducted at Hinthada District in Myanmar in 2016-2017

Treatments	Yield (ton/ha)					% starch content				
	Plot(1)	Plot(2)	Plot(3)	Plot(4)	**Average**	Plot(1)	Plot(2)	Plot(3)	Plot(4)	**Average**
1. $N_0P_0K_0$	11.86	20.20	18.89	-	**13.65**	28.94	28.94	28.94	28.94	**28.94**
2. $N_0P_2K_2$	21.80	9.82	18.54	14.47	**16.16**	28.94	31.05	31.05	28.94	**30.00**
3. $N_1P_2K_2$	21.43	22.11	18.69	19.32	**20.39**	28.94	28.94	28.94	31.05	**29.47**
4. $N_2P_2K_2$	26.63	25.63	25.90	22.24	**25.10**	31.05	28.94	28.94	31.05	**30.00**
5. $N_3P_2K_2$	27.96	22.06	21.91	23.94	**23.97**	28.94	28.94	26.83	31.05	**28.94**
6. $N_2P_0K_2$	27.46	22.49	18.52	19.47	**21.98**	28.94	31.05	31.05	28.94	**30.00**

$N_{0=}$ 0KgN/ha
$N_{1=}$ 40KgN
$N_{2=}$ 80kgN
$N_{3=}$ 160kgN

$P_{0=}$ 0kgP2o5/ha
$P_{1=}$20kgP2o5
$P_{2=}$40kgP2o5
$P_{3=}$80kgP2o5

$K_{0=}$0K2o/ha
$K_{1=}$ 40k
$K_{2=}$ 80
$K_{3=}$160

Effect of Fertilizer application trial on root production conducted at Hinthada District in Myanmar in 2016-2017

Treatments	Yield (ton/ha)					% starch content				
	Plot(1)	Plot(2)	Plot(3)	Plot(4)	Average	Plot(1)	Plot(2)	Plot(3)	Plot(4)	Average
7. $N_2P_1K_2$	11.86	16.13	27.01	23.82	**21.68**	31.05	28.94	28.94	28.94	**28.47**
8. $N_2P_3K_2$	21.80	22.01	25.58	25.93	**24.91**	28.94	28.94	28.94	28.94	**28.94**
9. $N_2P_2K_0$	21.43	24.22	26.38	25.13	**23.03**	20.51	28.94	31.05	31.05	**27.89**
10. $N_2P_2K_1$	26.63	20.95	26.31	26.66	**24.76**	28.94	31.05	26.83	31.05	**29.47**
11. $N_2P_2K_3$	27.96	24.70	27.54	25.45	**27.63**	28.94	31.05	28.94	31.05	**30.00**
12. $N_3P_3K_3$	27.46	32.44	26.51	26.83	**27.54**	28.94	31.05	31.05	28.94	**30.00**
Average	23.48	21.48	23.07	23.02	**22.57**	28.59	29.82	29.29	30.09	**29.43**

Average result of fertilizer application trial for root production conducted at Hinthada District in Myanmar in 2016-2017

Treatments	Fresh Root Yield (t/ha)	Root Starch Content %	Gross Income ('000) kyat/ha	Production Cost ('000) kyat/ha	Net Income ('000) kyat/ha
1. $N_0P_0K_0$	13.65	28.94	1146	518	628
2. $N_0P_2K_2$	16.16	30.00	1357	689	668
3. $N_1P_2K_2$	20.39	29.47	1712	731	981
4. $N_2P_2K_2$	25.10	30.00	2108	773	1335
5. $N_3P_2K_2$	23.97	28.94	2013	857	1156
6. $N_2P_0K_2$	21.98	30.00	1846	685	1161

Average result of fertilizer application trial for root production conducted at Hinthada District in Myanmar in 2016-2017

Treatments	Fresh Root Yield (t/ha)	Root Starch Content %	Gross Income ('000) kyat/ha	Production Cost ('000) kyat/ha	Net Income ('000) kyat/ha
7. $N_2P_1K_2$	21.68	28.47	1821	729	1092
8. $N_2P_3K_2$	24.91	28.94	2092	861	1231
9. $N_2P_2K_0$	23.03	27.89	1934	690	1244
10. $N_2P_2K_1$	24.76	29.47	2079	732	1347
11. $N_2P_2K_3$	27.63	30.00	2320	856	1464
12. $N_3P_3K_3$	27.54	30.00	2313	1028	1285
Average	22.57	29.43	1895	762	1133

2:2:3 ratio of N-P-K fertilizer application resulted in the highest net income

Average result of Varietal Evaluationtrial for root production conducted at Laymyethnar Township in 2016-2017

Treatments	Fresh Root Yield (t/ha)	Root Starch Content %	Gross Income ('000) kyat/ha	Production Cost ('000) kyat/ha	Net Income ('000) kyat/ha
1. Rayong-90	39.9	31.05	3352	729	**2622**
2. KM 98-1	40.11	31.05	3369	729	**2640**
3. NEP	40.06	31.05	3365	729	**2636**
4. NARC-61	19.54	28.94	1642	729	**912**
5. Local	11.55	27.54	970	729	**241**
Average	**30.23**	**29.92**	**2539**	**729**	**1810**

the four varieties are compared in terms of net income, KM 98-1 is the best of the net income

Major Constraints of Cassava Production

- Current cassava production is very labor-intensive.
- Higher-yielding varieties are not widely used.
- Farmers are lack of access to improved agronomic techniques.
- There is low awareness of adequate and well-balanced fertilization.
- Price is often fluctuated.
- Farmers are lack of adequate financial resources.

Conclusions

Future sustainable development of cassava production needs –

- Research findings
- Appropriate new technologies
- Adequate and well-balanced fertilization
- Soil conservation
- Mechanization of relevant steps of cassava production
- On-farm utilization of cassava roots and leaves for animal feeding

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