Role of Research Development Linking to Private Sector in Myanmar Rice Seed Development Strategy- MRSDS

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- Introduction
- Current Rice Research Activities at DAR
- Seed Production and Distribution System
- Seed Production Capacity
- General

INTRODUCTION

Rice in Myanmar

• Myanmar	- Agriculture Country
• Population	- 51.42 million
• Rice area	- 7.28 M ha
• Rice Production	- 28.32 M mt
• Average Yield (tha^{-1})	- 3.9 tha^{-1}
• Target Yield (tha^{-1})	- 5 -10 tha^{-1}
• Ways to promote rice production	- Yield increase per unit area
	- Crop Intensification
• Prominent success	- a major rice exporter last 25 years ago

Source – Myanmar Agriculture at a Glance,2014

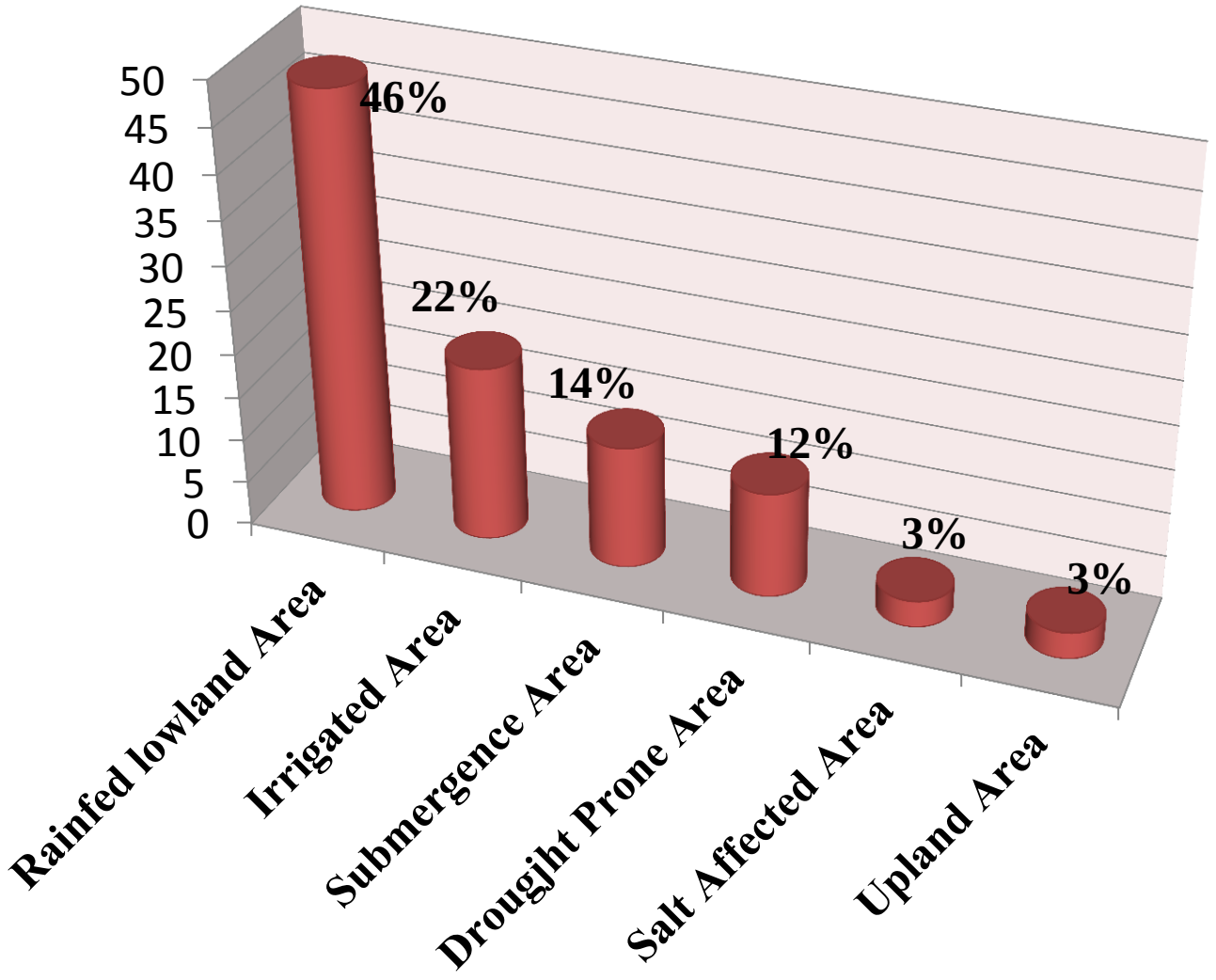
INTRODUCTION

Policies

- To emphasize production and utilization of high yielding and good quality seeds
- To conduct training and education activities for farmers and extension staff to provide advanced agricultural techniques
- To implement research and development activities for sustainable agricultural development
- To encourage transformation from conventional to mechanized agriculture, production of crops appropriated with climate and extension of irrigated area
- To amend existing agricultural laws and regulations in line with current situation

INTRODUCTION

Different ecosystems for rice cultivation in Myanmar



Current Rice Research Activities at DAR

❖ Vision

With the impact of advanced agricultural research, it is aimed at improving Agricultural Sector through increase in farmers' income and upgrade of national economy.

❖ Mission

DAR is to systematically conduct research activities that would suit to the needs of all stake holders which include producers, distributors and consumers in developing and dissemination of regionally adapted crop varieties and crop production technology.

Objectives

- To develop high yield varieties which are well adapted to different locations with resistance to pest and diseases and good grain quality

- To identify tolerant varieties preferred by farmers for specific locations

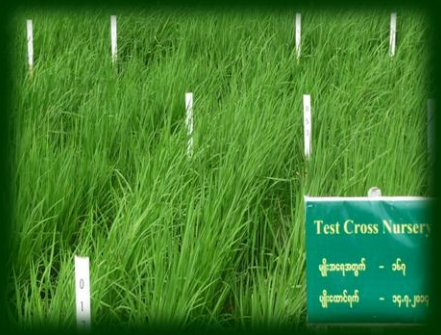
Research Activities

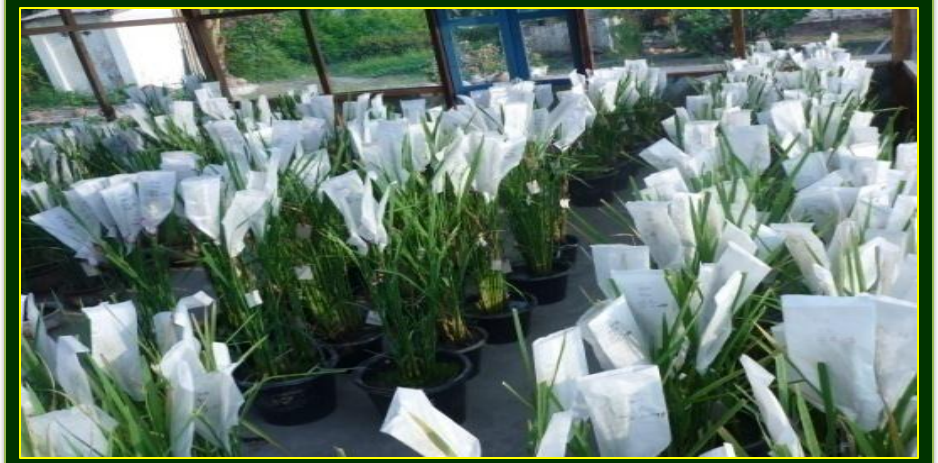
Irrigated

Aerobic Rice

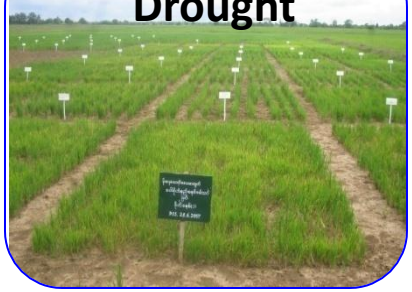
Salinity

Heat stress





Drought



Submergence

Quality Rice

Breeding Methods

- Introduction
- Indigenous Selection
- Hybridization and Selection
- Tissue Culture
- Mutation Breeding
- MAS (Marker Assisted Selection}
- Hybrid rice Breeding

Current Rice Varietal Improvement Program in DAR

- Improvement of Enhancing Rice Productivity for Favorable Lowland Rice Environment
- Improvement of Sustainable Rice Productivity for Unfavorable Rice Environments as Flood-prone, Salt-affected, Drought-prone and Upland
- Improvement for Resistance to Biotic Stress as BB, BLS , BPH and SB, etc.
- Improvement for good grain quality, and eating quality for Export and Local market
- Development of Green Super Rice (High yield, good quality, resistant to major diseases and pest, low fertilizer use)

Rice Varietal Improvement Program – Strong collaboration between DAR - IRRI

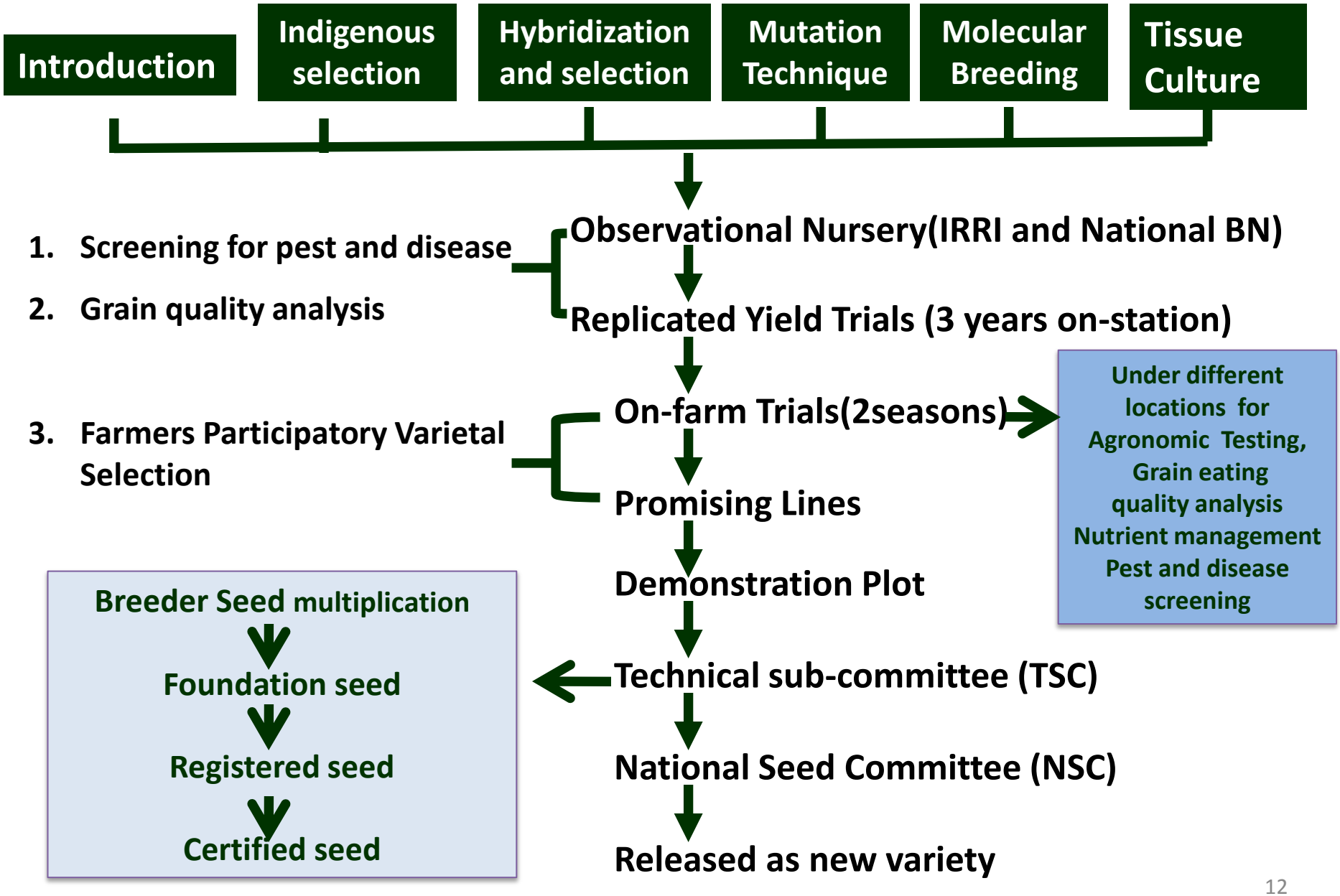
Rainfed Lowland Rice

Abiotic Stress Resistance	Biotic Stress Resistance
Drought- prone	BPH resistance
Flood-prone	Gall midge resistance
Salt affected	Rice Blast resistance
Lodging resistance	Stem borer
Fresh seed dormancy	Bacterial Blight resistance

Irrigated Lowland Rice

Abiotic Stress Resistance	Biotic Stress Resistance
Water use efficiency	BPH resistance
Heat tolerance	Blast resistance
Submergence tolerance	Bacterial Blight resistance
Soil stress tolerance	Stem borer
Nutrient use efficiency	Gall midge resistance

National Rice Varietal Testing and Release Procedures



Achievements on Rice Breeding through Collaboration with IRRI

Year Released	No. of released varieties	Irrig a ted	Rain fed	De ep	Dro ught	Salt Tole rant	Qual ity	Bact erial	Short Durat	Up lan	Sub mer ge	Aer obic	Quality Hybrid
1966	1	1											
1970-1976	10	10											
1977-1981	15		6	3	6								
1983-1985	19	6		5	2	3	3						
1986-1990	4	1	2		1								
1995-2004	10								7	1	2		
2005-2012	10						1	1	1		1	2	4
2012-2013	6		1			1	2				1	1	
2013-2014	3		1				1					1	
2014-2015	6					2	2				1	1	
Total	84	18	10	8	9	6	9	1	8	1	5	5	4

Released Varieties for 2013-14

Rainfed Lowland Rice

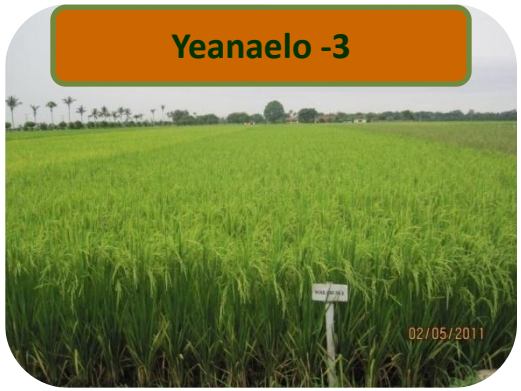
Thiri Thukha

Maturity days	-145
Plant Height(cm)	-140
Tillers/hill	-8-9
Total grains/panicle	-162
Amylose content%	-25.8
Eating quality	-Soft,good
Yield (tha^{-1})	-4.5-5
Suitable regions & Irrigated dry zone areas	-Rainfed

Aerobic Rice

Maturity days	-120
Plant Height(cm)	-111
Tillers/hill	-8-10
Total grains/panicle	-178
Amylose content%	-25.5
Eating quality	-good
Yield (tha^{-1})	-4-5
Suitable regions Irrigated dry zone areas	-Summer&

Yeanaelo -3



Quality Rice

Shwe Pyi Hmwe

Maturity days	-101
Plant Height(cm)	-97
Tillers/hill	-9-12
Total grains/panicle	-147
Amylose content%	-23.9
Eating quality	-good
Yield (tha^{-1})	-4-5
Suitable regions & Irrigated areas	-Rainfed

Released Varieties for 2014-2015

Shwe Asean

Maturity days	-120
Plant Height(cm)	-111
Total grains/panicle	-178
Amylose content%	-25.5
Yield (tha^{-1})	-4-5
Suitable regions	-Summer&
Irrigated dry zone areas	

Sin Thiri May


Maturity days	-120
Plant Height(cm)	-111
Total grains/panicle	-178
Amylose content%	-25.5
Yield (tha^{-1})	-4-5
Suitable regions	-Summer&
Irrigated dry zone areas	

Yeanaelo -4

Maturity days	-120
Plant Height(cm)	-111
Total grains/panicle	-178
Amylose content%	-25.5
Yield (tha^{-1})	-4-5
Suitable regions	-Summer&
Irrigated dry zone areas	

Pyi Myanmar Sein

Maturity days	-120
Plant Height(cm)	-111
Total grains/panicle	-178
Amylose content%	-25.5
Yield (tha^{-1})	-4-5
Suitable regions	-Summer&
Irrigated dry zone areas	

Pyi Taw Yin

Maturity days	-120
Plant Height(cm)	-111
Total grains/panicle	-178
Amylose content%	-25.5
Yield (tha^{-1})	-4-5
Suitable regions	-Summer&
Irrigated dry zone areas	

Yeamyokekhan -2

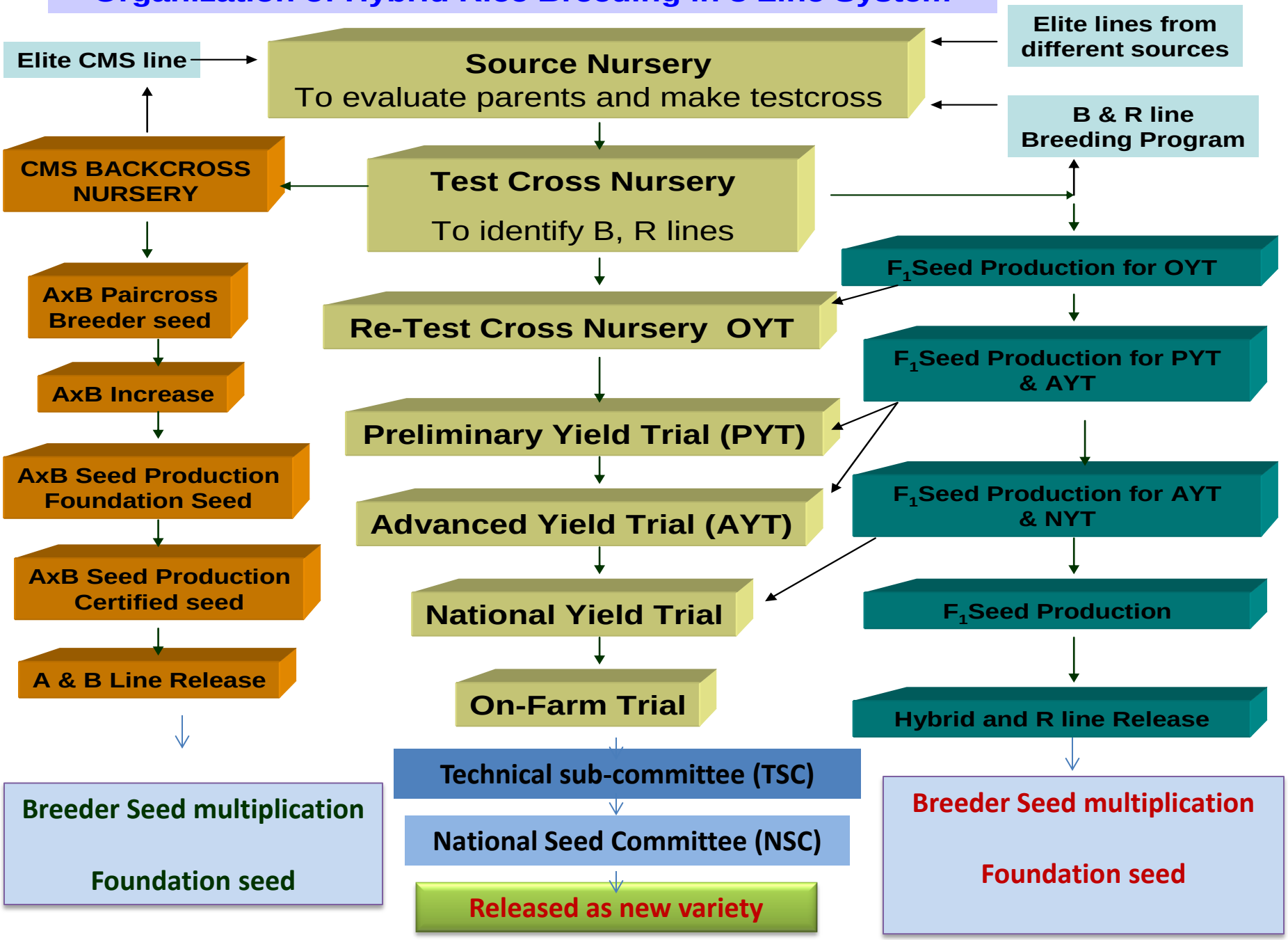
Maturity days	-145
Plant Height(cm)	-140
Total grains/panicle	-162
Amylose content%	-25.8
Yield (tha^{-1})	-4.5-5
Suitable regions & Irrigated dry zone areas	-Rainfed

Hybrid Rice Research

Main objectives

- ❖To develop own parental lines for Myanmar
- ❖ To identify quality hybrids
- ❖ To increase grain yield per unit area
- ❖ To improve national rice production
- ❖ To prepare the food security for future Myanmar

Organization of Hybrid Rice Breeding in 3 Line System



Parental line Breeding

Nursery	Number	Gene Frequency %
Source Nursery	2646	
Test Cross Nursery	1842	
B gene	38	2.06 %
R gene	15	0.81 %

Rice Hybrids Released in 2014 and 2015

Hybrids Released in 2014 - **Yezin Palethwe -1**

Yezin Palethwe-2

Hybrids Released in 2015 - **Yezin Palethwe-3**

Theingi Palethwe

Research Activities collaborated with HRDC (Hybrid Rice Development Consortium)

2016 HRDC Hybrid Rice Demonstration

- Lacation : DAR, Yezin, DAR
- Season : 2016 Dry Season
- Design : 20 x 1 Simple
- Date of sowing : 21.12.2015
- Date of transplanting : 20.1.2016

2016 HRDC Multi-location Yield Trial

- Lacation : DAR, Yezin, DAR
- Season : 2016 Dry Season
- Design : 39 x 3 RCB
- Date of sowing : 21.12.2015
- Date of transplanting : 20.1.2016

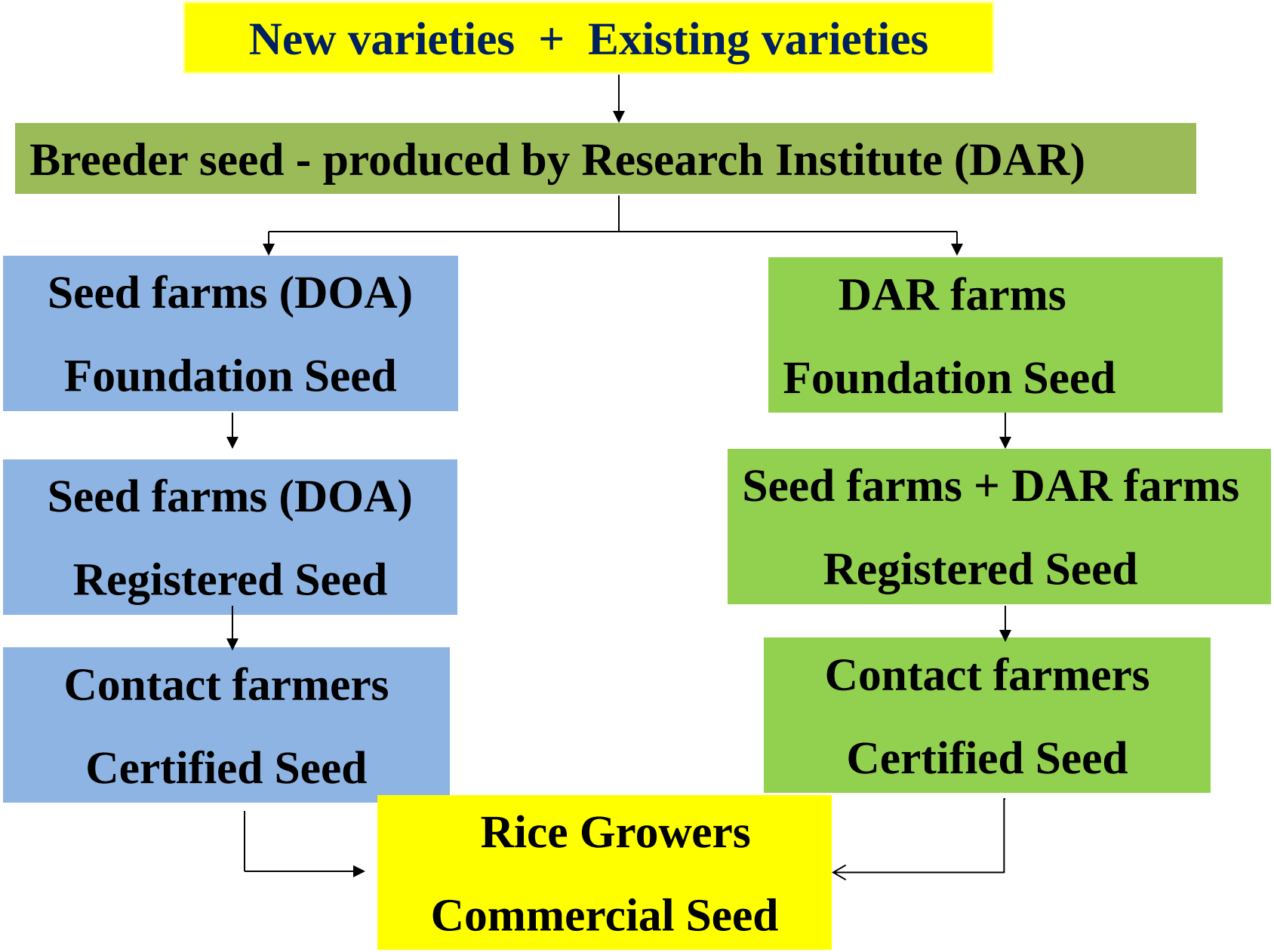
National and International Collaboration for Rice Varietal Development

A. National
   - Yezin Agricultural University (YAU)
   - Department of Agriculture (DOA)

B. International
   - FAO
   - IRRI, HRDC
   - Biodiversity International
   - IAEA

C. Regional
   - JICA (Japan)
   - KOICA (Korea)
   - ACIAR (Australia)
   - RDA (Korea)
   - YAAS (China)

Seed Production and Distribution System



Standard of seed qualification on seed classes in Myanmar

Seed Class	Purity %	Germination %	Moisture Content%	Red grain /500 gm	Weed seed /500 gm	Inert matter %	Other seeds
BS	99	90	13	0	3	1	0
FS	98	90	13	1	5	2	10/kg
RS	98	85	13	3	10	2	0.5
CS	97	80	13	5	10	3	1.0

- **Remarks**

BS - Breeder seed
FS - Foundation seed
RS - Registered seed
CS - Certified seed

Seed Production Capacity

in Myanmar

Rice Research Farms on Seed Multiplication under DAR (2015 -2016 WS)

Sr. No	Farms	Rice Ecology	State/ Region	FS	RS	CS	Total acres
1	Loikaw	Irrigated	Kayar		41.00	3.85	44.85
2	Kyaukse	Irrigated	Mandalay	2.7	40.5	-	43.2
3.	Pangon	Irrigated	Sagaing		19.00		19.00
4.	Kingpontaung	Irrigated	Magway		11.00		11.00
5.	Moenyin	Rainfed	Kachin	1.20	35.70		36.9
6.	Lapadan	Rainfed	Bago	79.75			79.75
7.	Myaungmya	Rainfed	Ayeyarwaddy	1.83	30.31		32.14
	Total Area (Acre)						266.84

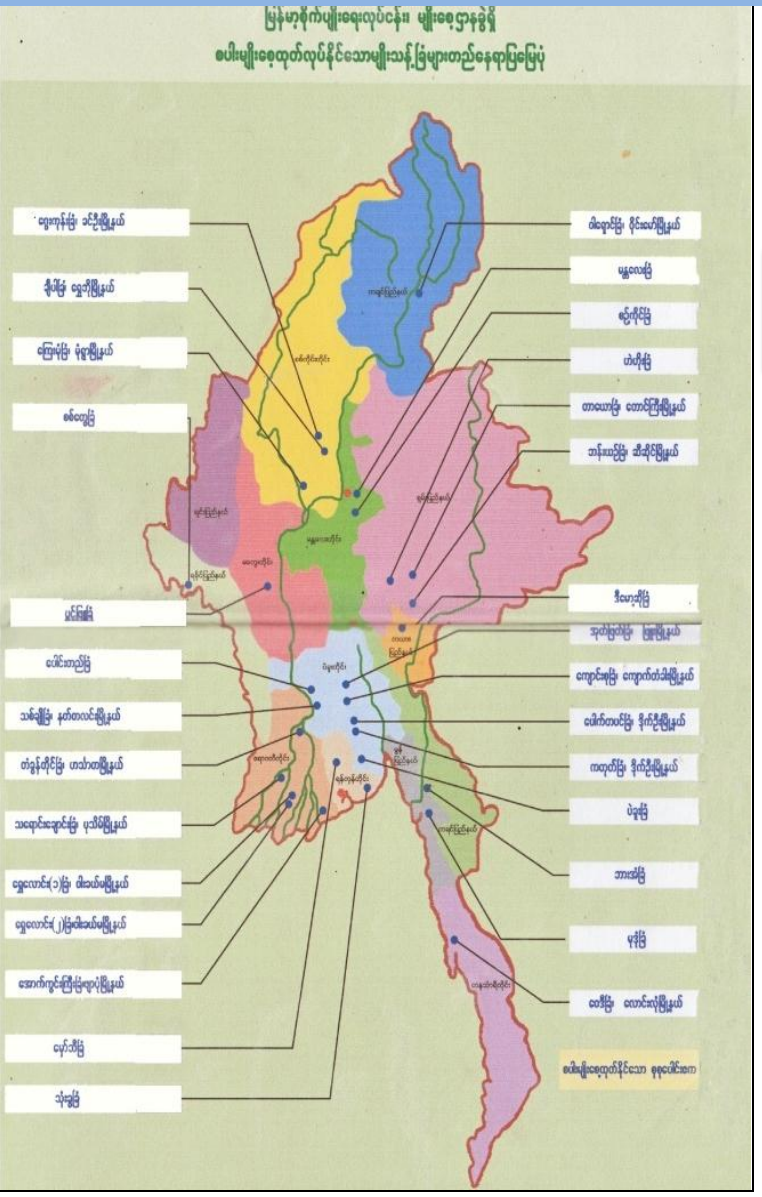
Seed Farms under DOA

Sr.No	Farms	State/Region	Township	Area (ac)
1.	Washaung	Kachin State	Waing Maw	116.15
2.	Demawsoe	Kayah State	Demawsoe	79.87
3.	Ngwe Taung	Kayah State	Loikaw	378.00
4.	Hpa-an	Kayin State	Hpa-an	47.32
5.	Chepa	Sagaing Region	She bo	82.00
6.	Gwaygone	Sagaing Region	Khin Oo	53.26
7.	Ye Oo	Sagaing Region	Ye Oo	92.08
8.	Waedi	Tanintharyi Reg:	Laung Lon	379.57
9.	Kadoke	Bago Region	Daik Oo	100.00
10.	Kyaung Su	Bago Region	Kyauk Tagar	397.00
11.	Bago	Bago Region	Bago	152.45
12.	Pauktapin	Bago Region	Daik Oo	104.13
13.	Oak Phyat	Bago Region	Phyu	145.94
14	Paunde	Bago Region	Paunde	87.48
15.	Thitcho	Bago Region	Natttalin	1000.00
16.	Pwepyae	Bago Region	Thegone	115.00
17.	Pwint Phyu	Magway Region	Pwint Phyu	135.47
18.	Sintkaing	Mandalay	Sintkaing	98.51

Seed Farms under DOA

Sr.No	Farms	State/Region	Township	Area (acre)
19.	Mandalay	Mandalay	Mandalay	35.30
20.	Chaungmagyi	Mandalay	Pyaw Bwe	250.00
21.	Kyetmauktaung	Mandalay	Kyaukpadaung	100.00
22.	Mudon	Mon State	Mudon	154.17
23.	Hmawbi	Yangon Region	Hmawbi	454.00
24.	Thonegwa	Yangon Region	Thonegwa	138.28
25.	Aung Myayar	Yangon Region	Dagon Myothit (South)	113.64
26.	Sittway	Rakhine State	Sittway	57.85
27.	Taryaw	Shan State	Taunggyi	53.00
28.	Heho	Shan State	Kalaw	195.74
29.	Banyin	Shan State	Sisaing	621.33
30.	Taguntaing	Ayeyarwady	Hinthada	127.55
31.	Thayaungchaung	Ayeyarwady	Pathein	150.20
32.	Shwe Laung-1	Ayeyarwady	Wakema	630.00
33.	Shwe Laung -2	Ayeyarwady	Wakema	105.00
34.	Auk Kwin Gyi	Ayeyarwady	Pyapon	90.00
	Total Area (Acre)			6840.29

Rice Seed Farms under DOA



Annual Seed Production by State Farm

Foundation and Registration Seed Class

(2011 - 2015)

Crop	Farms	Area (Acre)			
		2011-2012	2012-2013	2013-2014	2014-2015
Rice	**29**	**2591.45**	**2445.5**	**2402.3**	**2184.75**
Pulses	25	935.12	1027.26	1470.01	1823.74
Oil seed	14	510.5	577.5	662.73	764
Other cereals	10	142	160.99	102.98	168
Total	40	4179.07	4211.25	4638.02	4940.49

Source ; Seed Division ,DOA

Breeder Seed Distributed from 2008 to 2015

No	Name of Varieties	Distributed (basket)							
		2008	2009	2010	2011	2012	2013	2014	2015
1.	Manawthukha	13.5	9.0	17.2	27.0	23.0	18.5	8.0	7.0
2.	Sinthukha	-	15.0	6.0	18.0	18.0	22.0	21.5	22.0
3.	Sinthwelatt	21.0	12.0	9.0	18.6	15.5	20.0	8.5	9.5
4.	Kyawzeya	9.0	9.0	9.0	10.5	10.5	8.5	3.0	1.5
5.	Shwewarhtun	1.5	3.0	6.0	10.0	10.0	8.0	7.5	1.0
6.	Sinekari-3	1.5	1.5	6.0	7.5	7.5	4.0	4.0	2.0
7.	Hmawbi-2	2.0	4.0	6.0	3.6	3.5	12.5	8.0	4.5
8.	Sin Nweyin	15.0	38.5	7.5	2.4	2.0	7.5	-	-
9.	MR-9	-	3.0	0.5	1.2	1.0	1.5	-	-
10	Ayeyarmin	10.5	4.5	6.8	6.6	6.5	16.0	16.0	12.0
11.	Yadanartoe	-	-	3.0	7.5	7.5	10.0	10.0	17.0
12.	Shwethweyin	10.5	19.5	9.5	2.4	2.0	6.0	5.5	1.0
13.	Shwemyanmar	-	3.0	4.0	3.0	3.0	4.5	1.0	2.0
14.	Shwepyihtay	-	-	1.5	3.0	2.5	1.0	3.0	-
15.	Pawsanbaykyar	-	1.5	1.5	6.0	6.0	6.5	-	4.0

Breeder Seed Distributed from 2008 to 2015 (continued)

No	Name of Varieties	Distributed (basket)							
		2008	2009	2010	2011	2012	2013	2014	2015
16.	Shwemanaw	-	-	1.5	1.5	1.5	-	-	-
17.	Nantharhmwe	-	-	2.0	4.5	4.5	1.0	-	-
18.	Hnankar	-	-	3.0	6.6	2.5	4.0	2.0	-
19.	Swarna-Sub1	-	6.0	3.0	1.5	1.5	0.5	1.5	1.5
20.	IRAT 191	-	-	-	1.5	1.5	-	-	-
21.	IR 747	2.0	1.5	3.0	1.5	1.0	-	-	-
22.	Manawhari	2.0	1.5	3.0	1.5	1.0	-	-	-
23.	Shwebo-1	-	-	2.0	3.0	1.0	-	-	-
24.	Einmayebaw	-	-	2.0	3.6	1.5	1.5	-	-
25.	Shweyinaye	-	-	-	5.0	5.0	1.0	1.5	-
26.	YZ Lonethwe	19.5	7.5	1.0	1.5	1.5	2.0	-	1.0
27.	Shwepyitan	1.5	-	-	-	-	-	-	1.5
28.	SaltSinthwelatt	-	5.0	-	1.0	-	1.5	1.5	-
29.	Pawsanyin	-	-	-	4.5	-	3.0	11.5	1.5
30.	Pawsanhmwe	-	-	4.5	1.5	-	3.0	-	-

Breeder Seed Distributed from 2008 to 2015 (continued)

No	Name of Varieties	Distributed (basket)							
		2008	2009	2010	2011	2012	2013	2014	2015
31.	Thukhayin	3.0	-	-	-	-	2.0	-	-
32.	Theedatyin	2.0	3.0	4.5	10.5	-	17.5	3.5	3.0
33.	Yet 90	-	-	-	-	-	0.5	-	-
34.	Yar 2 Tun	3.0	-	1.5	1.5	-	-	-	-
35.	Lonethwehmwe	3.0	-	0.5	0.6	-	-	-	-
36.	Konemyint-4	1.5	-	-	-	-	-	-	-
	Total	122	149	125	193	141	184	121	92

Remarks	2008	2009	2010	2011	2012	2013	2014	2015
No. of varieties grown	18	19	28	32	26	27	18	17
Seed Distributed (bkts)	122	149	125	193	141	184	121	92

Seed Distribution of Hybrid Rice (kg)

Sr	Variety Name	2012-2013	2013-2014	2014-2015	2015-2016
1	YZ Pale Thwe 1 A	3085	899.5		
2	YZ Pale Thwe 1 R	1537	651.5	255	
3	YZ Pale Thwe 2 A	637			
4	YZ Pale Thwe 2 R	398		-	3
5	YZ Pale Thwe 3 A		213		42
6	YZ Pale Thwe 3 R			105	15
7	YZ Pale Thwe 1 F1			356	8974
	Total (Kg)	9246	1763.5	716	9034

Seed production Area Requirement (CS) for Rice growing Area (16 Million Acre)

DEPARTMENT OF AGRICULTURAL RESEARCH
DAR
Yezin, Myanmar

Rice Seed Production Program

Year/ Season	2015 WS	2016 DS	2016 WS	2017 DS	2017 WS
Seed Class	BS	FS	RS	CS	Farmers'
Area (acre)	2	120	7200	432,000	1,728,000
Seed Production (Bsk)	120	7200	432,000	25,920,000	-

- Area requirement for CS = 432,000

Needs for Future Research and Development

Resource Person

Basic infrastructure

Technology / HRD

- Skilled / strong team
- Trainings
- Facilities (Lab equipment, machineries..)
- Capacity building
- Biotechnology
- Molecular breeding
- Germplasm exchange
- Collaboration

Needs for Future Research and Development

- Yield trials and Demonstration
- Agronomic practice
- Socio-economic Study
- Sustainable Research Management

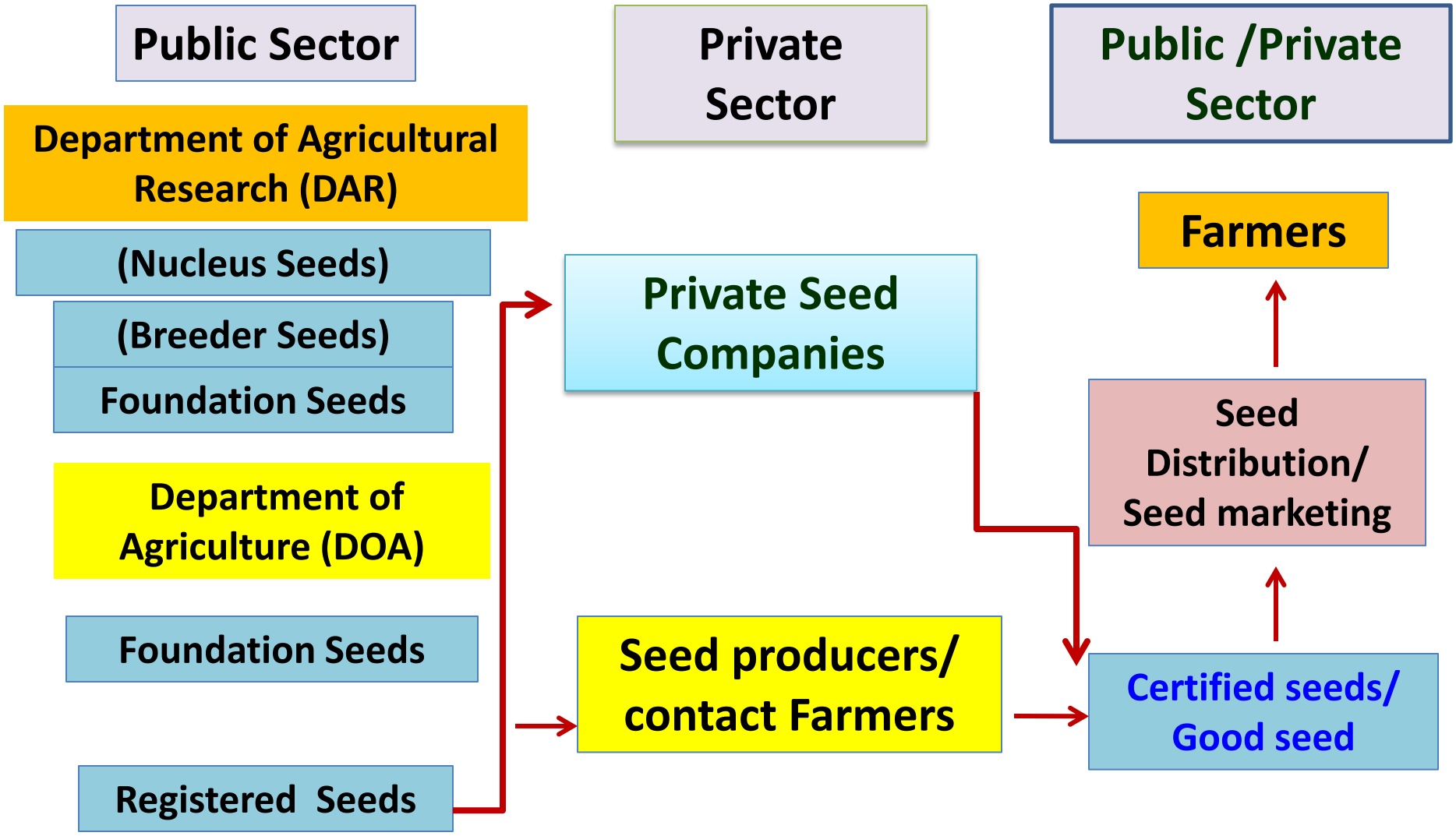
- Research/ extension linkage
- Skilled / strong team
- Farmers' participatory research
- Technology transfer
- Trainings (varieties/ agro-practice)
- Financial Aid

Needs for Future Research and Development

- Seed production Research
- Seed production (BS, FS)
- F1 Seed Production
- Socio-economic Study

- Research/ extension linkage
- Farmers
- Technology transfer
- Trainings (varieties/ agro-practice)
- Public sector
- Private Public Partnership
- Policy (Dissemination,)
- Market acceptability

Seed Production and Distribution System Collaborate with Private Sector



THANK YOU for YOUR KIND ATTENTION