Winds of Change:
A Rapid Appraisal of Four Pulse Value Chains in Myanmar

Steven Haggblade, Duncan Boughton, L Seng Kham and Myo Thaung

Michigan State University (MSU)
and
Myanmar Resource Development Institute/
Centre for Economic and Social Development (MDRI/CESD)

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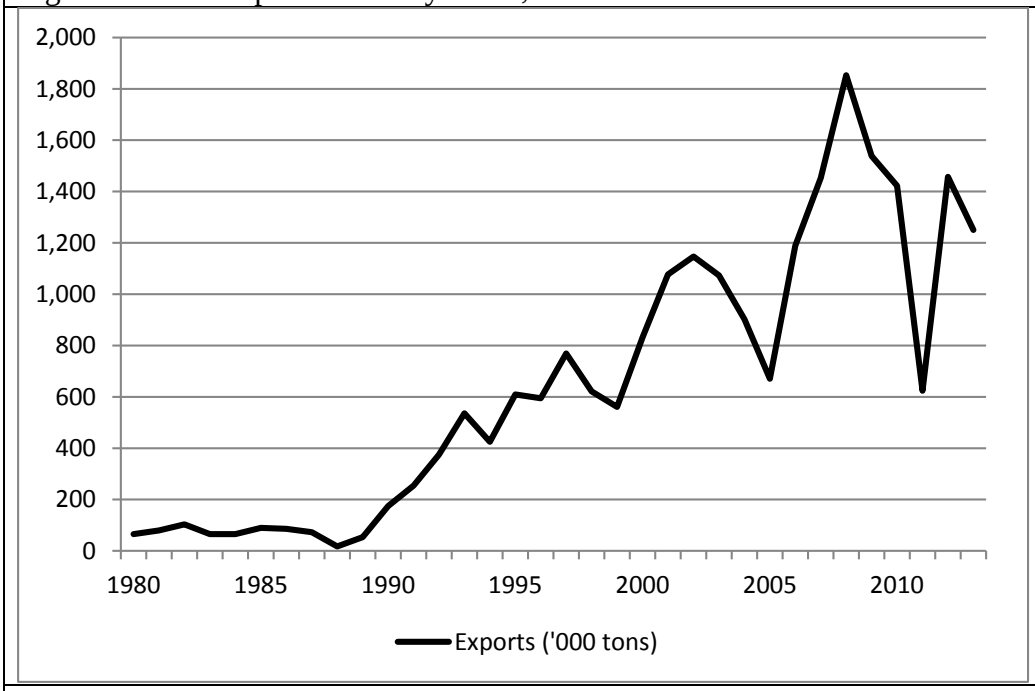
1. Introduction

Pulse exports from Myanmar have grown into a $1 billion export industry in the 25 years since liberalization (Table 1). As the first major agricultural sector to be liberalized, in 1988, pulses offered uniquely attractive returns to both farmers and traders. Farmers and traders responded with alacrity to these new opportunities, propelling pulse production and exports rapidly upwards for several decades (Figure 1). By 1991, pulses surpassed rice to become Myanmar's most valuable agricultural export (Okamoto 2008, Table II-8). From less than 100,000 tons in 1980, exports have increased to nearly 1.5 million tons in 2010 (Table 1).

Punctuating several decades of rapid growth, a series of sharp pullbacks in pulse exports occurred in 2005 and 2011, triggered largely by changes in the Indian market which serves as destination for the majority of Myanmar's pulse exports. Since then, export performance has proven choppy (Figure 1). Industry watchers and policy makers wonder if Myanmar's potential has plateaued or whether growth can resume.

Figure 1. Pulse Exports from Myanmar, 1980 to 2013



Source: Official MOAI data as reported by FAOSTAT.

This report explores changes in Myanmar's pulse value chains since 1988, focusing on three key objectives. First, the paper examines factors driving the long first wave of growth in Myanmar's pulse production and exports. Second, it describes the current organizational structure, incentives and performance of Myanmar's four most important pulses value chains – green gram, black gram, pigeon pea and chick pea. Finally, the paper summarizes stakeholder observations about prospects for future growth in pulse value chains – at the farm level, in value added processing and in domestic and export markets.

Table 1. Trends in Pulse Exports from Myanmar, 1980 to 2013

	1980	1985	1990	1995	2000	2005	2010	2013
Value ($ millions)	20	29	87	239	255	255	1,013	913
Quantity ('000 tons)	66	90	175	610	831	670	1,422	1,420
Price ($ per ton)	307	328	498	392	307	381	712	643

Source: FAOSTAT.

2. Methods

This paper builds on several important existing studies of pulse production and marketing in Myanmar. The first of these, by Okamoto (2008), provides an exceptionally insightful case study of the first decade and a half of pulse market liberalization in Myanmar based on detailed field surveys of green gram farmers and traders in a district near Yangon undertaken between 1998 and 2003. More recent market monitoring of domestic and international pulse markets by Etrade likewise provides keen insights into evolving international pulse markets as well as domestic production systems (Kyaw Myint 2014). Related studies of pulse production and marketing, by FAO, MOAI and others serve as reference points and signposts documenting the status of pulse value chains at various points in time (MOAI 2010).

Photo 1: Field Visit to Pulse Growing Village in Lower Myanmar

The core of our understanding about current pulse market structure and operations comes from field interviews conducted over a three-week period in late February and early March 2014 (Photo 1). These interviews featured visits to five market towns in Lower Myanmar (two of which have commodity exchanges) and four of the seven commodity exchanges in Upper

Myanmar. In each zone, team members interviewed export traders, assembly brokers, processors and farmers. Pulse trade associations in Yangon and Mandalay provided the team with an overview of the pulse export trade, helped to categorize the various actors operating in each location into the following general categories: Singapore-based international export brokers, large domestic exporters, small speculator traders, assembly brokers. Team members then interviewed representatives from each category of intermediary, where possible at their place of business. In Lower Myanmar, the team visited 5 Singapore-based broker representatives resident in Yangon, 6 large exporters, 10 assembly market exchange traders and brokers, 2 processors and 11 farmers. In Upper Myanmar, the team interviewed 3 Mandalay-based exporters focusing on the China market, 10 assembly market exchange traders and brokers, 14 millers and processors and 20 farmers. Annex Table A.1 provide a full listing of the locations visited. Following preliminary analysis of the interview results and the secondary data, the team conducted follow-up interviews with traders and exporters during the months of April, July and August, primarily in Yangon.

The secondary data that serve to complement and help quantify findings from our field interviews pose special challenges. Like many agricultural data in Myanmar, official pulse production figures likely overstate domestic production levels considerably (see MSU/MDRI 2013, Chapter 2). Industry sources we interviewed consistently reported that, apart from chickpeas, at most only about 15% of domestic pulse production is consumed domestically, suggesting that official production estimates may overstate actual farm production of black gram, green gram and pigeon pea by a factor of two to three (Table 2). Farmers also reported very limited local consumption of green gram, black gram or pigeon pea, apart from seed retentions.

Export volumes and values prove far more credible. As a result, these serve as our best indicators of pulse market trajectories. Given the importance of pulse earnings to farmers and traders, regular price monitoring in pulse markets is currently under way by the MOAI's DSG as well as by the private market information service, E-Trade. Both trends and inter-annual price volatility help to flag major inflection points and key episodes governing pulse market trajectories. For that reason, export and domestic price data serve as key barometers of pulse market performance over time.

Table 2. Trader Estimates of Domestic Consumption of Pulses in Myanmar

	a) Estimated market shares (percent)			b) Exports ('000 tons)	c) Estimated Production ('000 tons)		
	Domestic consumption	Export	Total	2012	Official MOAI	Estimated from a) and b)	Official/ estimate
Black gram	10-15	85-90	100	599	1,500	666	2.3
Green gram	5-10	90-95	100	355	1,200	374	3.2
Pigeon pea	1-5	95-99	100	320	765	337	2.3
Chickpea	50-100	0-50	100	79	500	158	3.2

Source: Trader and miller interviews.

3. Tailwinds: The First Wave of Growth, 1988 to 2010

3.1. Market growth

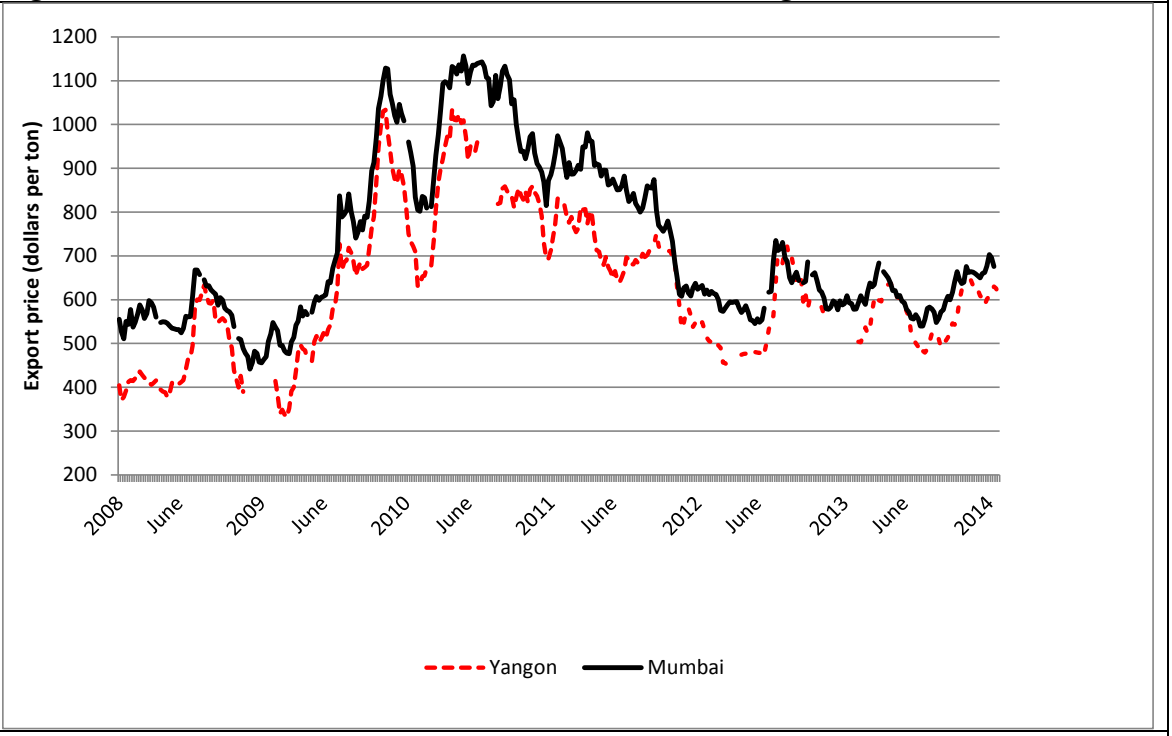
During the country's socialist period, from 1962 through 1988, Myanmar's government imposed tight controls on agricultural cropping choices, prices and marketing. Through a system of government-imposed production quotas, ministry officials established output targets for individual farmers covering most agricultural commodities, including paddy, pulses and oilseeds. Failure to comply constituted grounds for rescinding tillage rights, a credible threat given government ownership of all land. Government's parallel monopoly on all agricultural marketing implied forced sales at government-imposed prices. As a result, farming offered meager returns in most of Myanmar. "Because of strict control of prices and marketing for major agricultural produce, agricultural production yielded little profit for farmers during this period." (Okamoto 2008, p.3).

Liberalization of pulse marketing and production, beginning in 1988, rapidly and radically improved the profitability of domestic pulse production and trade. In quick succession, government dropped production quotas on pulses, liberalized domestic marketing and opened export marketing to private traders. While production quotas on paddy continued until 2003, pulses became the first major agricultural commodity to face a completely liberalized production and marketing environment. As a result, domestic pulse prices soared. By the mid-1990's, rapid gains in pulse prices had outpaced paddy prices by a factor of five, and pulse production had become significantly more profitable than monsoon or summer paddy (Fujitu and Okamoto 2006).

The parallel emergence of a ready market for pulse imports in India provided a large external demand outlet right on Myanmar's doorstep. Beginning from the mid-1960s, India's green revolution had propelled a major expansion of rice and wheat production, at the expense of pulses. As a result, by the late 1980's India had begun to experience major deficits in pulses. India's trade liberalization after 1991 opened its large domestic market to international suppliers. By 2003, Myanmar accounted for 40% India's pulse imports (Fujitsu and Okamoto 2006). From the earliest days, Indian imports have accounted for the bulk of Myanmar's pulse exports. As a result, pulse prices on the Mumbai exchange largely determine pulse prices in Yangon (Figure 2).[1]

[1] Seasonal variation in sea freight charges, ranging from about $20 per ton in the September-October period to as much as $50 per ton during the peak export period between March and May, explains part of the variation in price spreads between Yangon and Mumbai.

Figure 2. Black Gram Price Movements in Mumbai and Yangon



Source: Etrade (2014)

3.2. Production response to emerging market opportunities

The combination of radically improved domestic incentives together with a large nearby market propelled rapid growth in Myanmar's production of pulses for export (Table 3). Myanmar's three major pulses -- black gram, green gram and pigeon pea -- "showed remarkable growth throughout the 1990s. No other commodity experienced anything comparable. The production of these three pulses for export grew by 17 per cent per annum on average and came to account for 60-70 percent of Myanmar's agricultural exports in the 1990s" (Okamoto 2008, p.4).

Table 3. Trends in the composition of pulse exports from Myanmar, 1990 to 2013 ('000 tons)

	1990	1995	2000	2005	2010	2013
Black gram	27	117	235	407	615	658
Green gram	15	128	145	144	303	302
Pigeon pea		110	89	193	193	296
Chickpea				40	22	47

Source: Okamoto (2008), E-Trade (2014).

Area expansion has historically accounted for the bulk of the growth in Myanmar's pulse production (Figure 3). In Lower Myanmar, following liberalization, farmers began growing

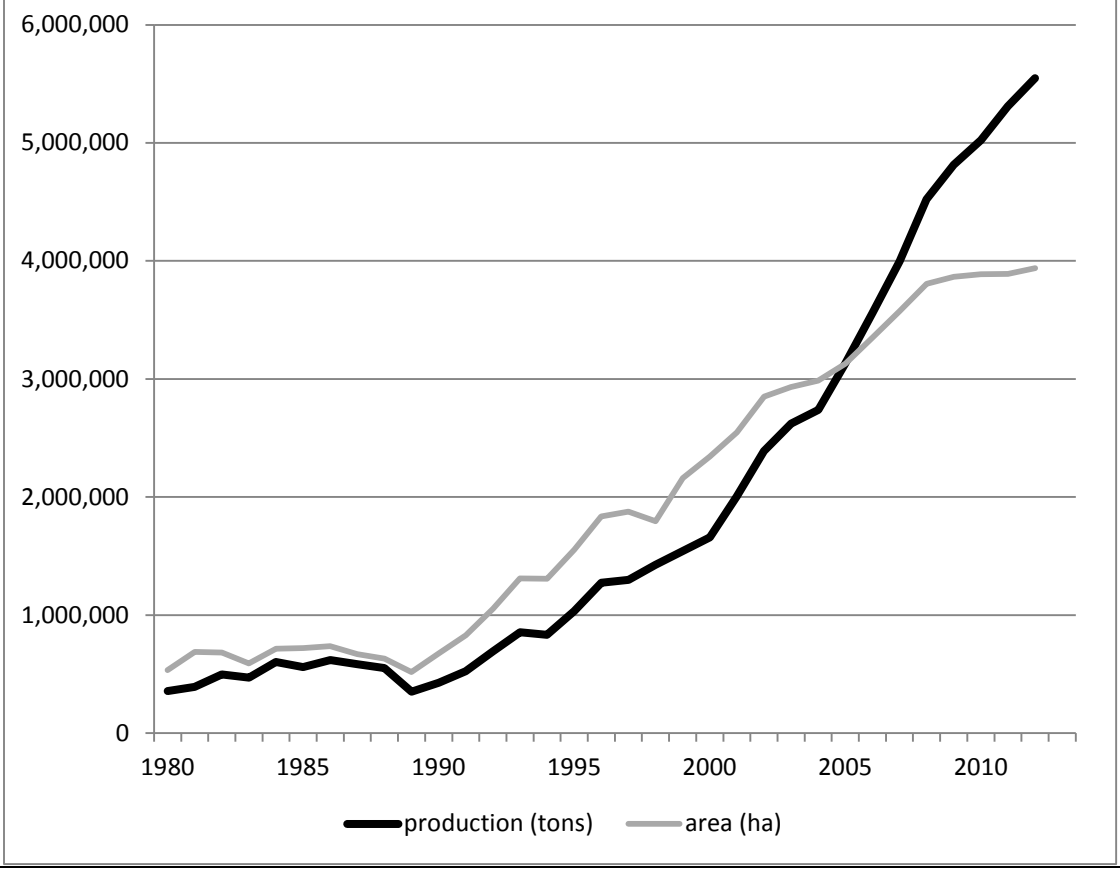
black and green gram in the winter season, sowing immediately after harvesting their monsoon paddy. With timely planting following the harvest of monsoon paddy, the short cropping cycles of 90 to 120 days for pulses permitted their production solely on residual moisture. "In Lower Myanmar, pulses were introduced everywhere as a second crop after monsoon paddy, a new development as there was virtually no second crop produced before 1988. In the dry season, idle land suddenly came to be utilized for the production of pulses." (Fujitsu and Okamoto 2006, p.14).

In Upper Myanmar, where more complex dryland cropping systems prevail, expansion of pulse area typically came at the expense of other crops. Long-cycle pigeon pea, a 200-day crop planted early in the monsoon season, has been grown for many generations as a livestock forage crop in Myanmar's dry zone, often intercropped with sorghum, cotton or sesame. As domestic pigeon pea prices surged in the 1990s, farmers began reducing the spacing allocated to intercrops between pigeon pea lines. Some even turned to sowing sole stands of pigeon pea. As a result, area expansion of pigeon pea came at the expense of these competing crops. Chickpea, a short-cycle cool season crop, competes with groundnut, sunflower and sometimes wheat for winter season lowlands. Green gram, a short-cycle 75 to 90-day crop, features an array of varieties suitable for different growing seasons. As a result, it competes with a wide array of monsoon and dry season crops, including sesame, groundnuts, chickpeas and sunflower (see Annex Table 2).

As a result of potential crop substitutions between pulses and oilseeds such as sesame and groundnuts, Myanmar's highly politicized oilseed policy serves to shape incentives for pulse growers. During the first long wave of pulse market growth, the early liberalization of palm oil imports in 1988 accentuated farmer interest in pulses, when slumping domestic prices for oilseeds such as sesame and groundnuts served to spur incentives for crop substitution in the Dry Zone, particularly for pigeon pea which competes in the same upland monsoon plots with monsoon sesame.

Today, three driving forces from the first long wave of Myanmar's pulse surge continue to shape trajectories going forward. First, international price signals continue to transmit directly to markets in Myanmar. Pigeon pea prices, for example, doubled between 2006 and 2007 before falling by 50% in 2009 and then doubling again in 2010 (see Figure 5). Secondly, the Indian market continues to have an outsized influence on pulse prices and production in Myanmar. A virtual cessation of chickpea imports into India during 2013, for example, has led to a chickpea glut in Myanmar and a slump in domestic chickpea prices. Third, swings in domestic and international oilseed markets continue to influence pulse production. Most recently, the spike in world sesame prices has translated into falling relative profitability of pulse production in Myanmar. While all three causal forces favored explosive growth of pulse production and exports in the 1990's and through most of the 2000s, the choppiness observed in recent years reflects uneven, sometimes contrary movements in these forces over time.

Figure 3. Trends in Pulse Production and Area in Myanmar



Source: MOAI as reported by FAOSTAT.

4. Turbulence: Current Structure and Performance of the Pulses Value Chain

4.1. Final markets

Black gram, Myanmar's largest pulse export, goes primarily to India where consumers from ancient times have used it to make dahl (Table 4). Pigeon pea and chickpea exports, likewise, target the India market. As a result, India has long dominated as the major destination for Myanmar's pulse exports (Table 5). Since Singapore serves as a transit point for the bulk of all pulses leaving Myanmar by sea, most of the Singapore reported volumes likewise end up in the Indian market.

Table 4. Composition of pulse exports from Myanmar, 2012/13

Pulse	Volume ('000 tonnes)	Value ($ USD)	Price ($US/tonne)
Black gram	658	382	581
Green gram	303	240	795
Pigeon pea	296	170	575
Chickpea	47	34	733
Cowpea	43	37	868
Others	73	50	685
Total pulses	1,420	913	643

Source: Etrade 2014.

Table 5. Trends in importing country share of the value Myanmar's pulse exports, 1992 to 2013

	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010	2011	2014
India	55.7	66.4	71.5	73.6	67.5			71.1	70.2	69.9	51.1	70.4
Singapore	14.4	7.6	8.6	4.7	5.7			4.1	6.8	11.9	15.6	3.5
China								7.6	10.8	2.4	13.4	11.2
Pakistan	16.3	8.3	6.5	4.8	2.1			5.5	5.1	1.2	0.6	1.3
Indonesia	0.4	7.1	5.9	7.2	11.7			4.4	3.4	2.3	3.1	1.2
Malaysia	2.4	4	3.5	4	4.1			4.1	3.2	5.1	2.2	1.6
Others	10.8	6.6	4	5.7	8.9			3.2	0.5	7.1	14.0	10.8
Total	100	100	100	100	100			100	100	100	100	100

Source: Okamoto (2008), Ministry of Commerce (2014), E-Trade (2014).

Green gram enjoys a more diversified set of market outlets. Over the past five to ten years, overland exports of green gram to China have become significant. A growing number of high-value markets such as Thailand, Taiwan, Indonesia and Malaysia attract green gram exports from Myanmar. European buyers have also entered the market recently, although it remains to be seen whether Myanmar will be able to meet strict traceability requirements. China and the high value markets in East Asia and Europe prefer the top quality (large diameter) green gram used for making bean sprouts.

Photo 2: Chickpea noodle manufacturing

Chickpea, unlike the other pulses, attracts a large domestic market in Myanmar. Dehuller mills split chickpeas for use in making dahl. In addition, roughly 50 vermicelli factories in Upper Myanmar currently use chickpeas to make fermented noodles. Although the factories can use any pulses as a substrate for making noodles, India's cessation of chickpea imports in 2013 has resulted in abnormally low domestic chickpea prices, making it currently the preferred input in the vermicelli factories (Photo 2).

In addition to large volumes of chickpea, domestic consumers eat a small share of black gram production, primarily in fried snack foods (Photo 3).

Pulse exports by sea transit Singapore en route for India and other Asian markets. In the early years, domestic traders sold virtually all pulse exports through Singapore-based Indian brokers. A combination of financial and market contacts made them key intermediaries in the marketing system. From about 2003 onwards, several of Myanmar's large domestic pulse traders have developed sufficient reputation and market contacts that they now export directly.

Photo 3: Fried black gram snacks on sale, Mandalay

4.2. Structure of the Pulses Value Chain: Production Systems

Pulses are produced in two distinct agro-ecological zones. We first present the specific characteristics of pulse production in the Dry Zone, followed by the Delta Zone.

4.2.1. Farm production and utilization in the Dry Zone

Upper Myanmar accounts for virtually all of Myanmar's pigeon pea and chickpea production (Figures 4a). Dry zone farmers also account for roughly one-third of green gram production (Figure 4b) but only 6% of black gram production. In terms of total planted area in Upper Myanmar, pigeon pea accounts for about half of all pulse acreage while green gram account for about 25%, chickpea 20% and black gram roughly 5% of cropped area (Tables 6 and 7). Roughly 1.8 million farmers grow pulses in Upper Myanmar. A recent review of livelihood strategies in this zone suggests that production and sale of pulses sales constitute the second most important source of income, supplying income to one-third of rural households in the region (Gibson 2013).

Pigeon pea, the dry zone's dominant pulse, is a long-cycle monsoon crop which farmers have grown since ancient times as a fodder crop for the region's many livestock. Farmers frequently intercrop pigeon pea with a wide variety of other monsoon and winter season crops, including sesame, groundnut, cotton, sorghum and green gram (Figure 5). As relative prices shift, from year to year, the intercrops become more or less prominent. During 2009 and 2010, when pigeon pea prices spiked (Figure 6), pure cropping became common. In the past few years, soaring prices of sesame and groundnut in the presence of falling pigeon pea prices have led to reductions in pigeon pea area at the expense of the oil crops.

Figure 4a. Pigeon pea and Chickpea production in Myanmar

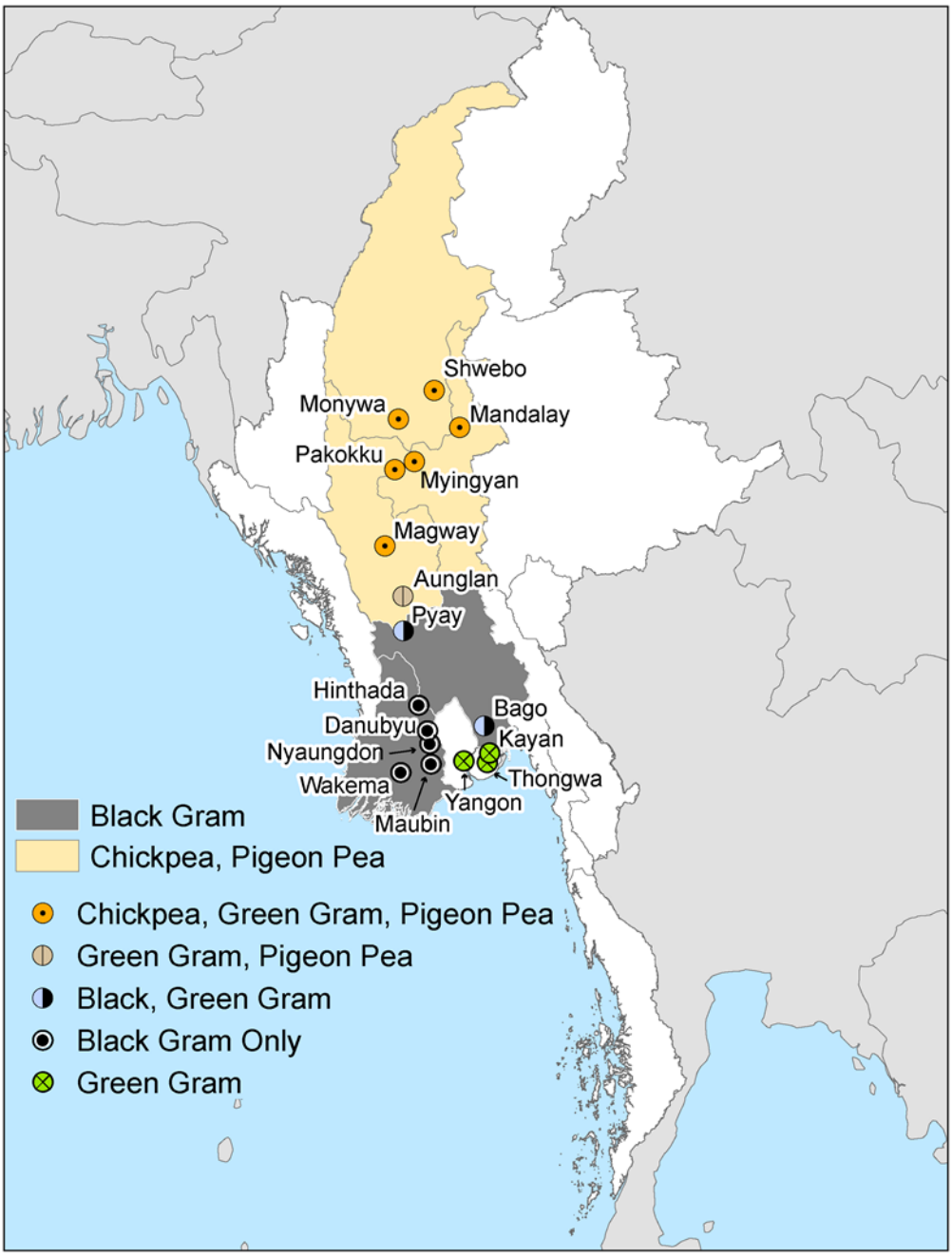


Figure 4b. Green gram production in Myanmar

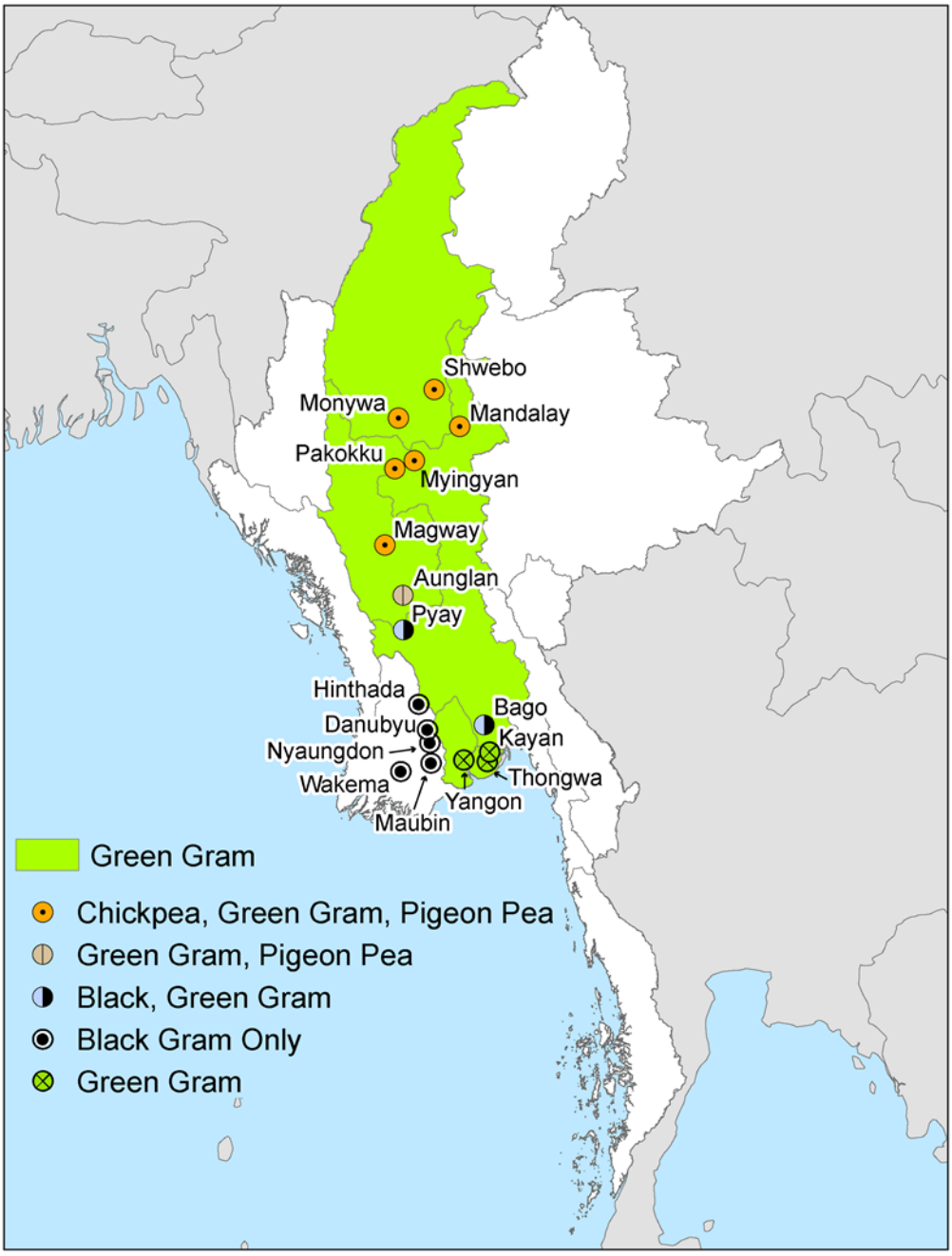


Table 6. Geographic distribution of area cropped in pulses in Myanmar, 2010

	Black gram	Green gram	Pigeon pea	Chickpea
Upper Myanmar				
Sagaing	2%	8%	40%	46%
Magway	1%	15%	33%	25%
Mandalay	3%	10%	21%	28%
Shan South	0%	0%	4%	0%
Shan North, East, Chin, Kachin	0%	0%	0%	0%
subtotal	6%	34%	98%	98%
Lower Myanmar				
Ayeyarwady	46%	6%	0%	0%
Bago East	25%	20%	0%	0%
Bago West	20%	1%	1%	1%
Yangon	3%	36%	0%	0%
Mon	0%	2%	0%	0%
Rakhine, Kayin,Tanintharyi, Kayal	0%	0%	0%	0%
subtotal	94%	66%	2%	1%
Total Myanmar	100%	100%	100%	100%
000 acres	5,814	3,786	2,515	1,126

Source: MOAI (2013).

Table 7. Area Planted to Pulses, 2010

	Black gram	Green gram	Pigeon pea	Chickpea	Total
Area planted to pulses ('000 acres)					
Upper Myanmar	321	1,304	2,476	1,107	5,207
Lower Myanmar	5,494	2,482	39	16	8,030
Toptal Myanmar	5,814	3,786	2,515	1,126	13,240
Share of pulse area					
Upper Myanmar	0.06	0.25	0.48	0.21	1.00
Lower Myanmar	0.68	0.31	0.00	0.00	1.00
Total Myanmar	0.44	0.29	0.19	0.09	1.00

MOAI (2013).

Chickpea is exclusively a cool season crop, planted frequently in lowlands following the monsoon paddy harvest (Figure 5). Unlike the other export pulses, chickpea is consumed widely in domestic markets. Chickpea dehuller mills are located in all of the major market centers and mill and split chickpeas for use in dahl. In addition, clusters of vermicelli noodle factories, numbering perhaps 50-100 in Mandalay, Monywa and environs, purchase chickpea flour which they ferment, extrude and package as vermicelli noodles for sale throughout Myanmar.

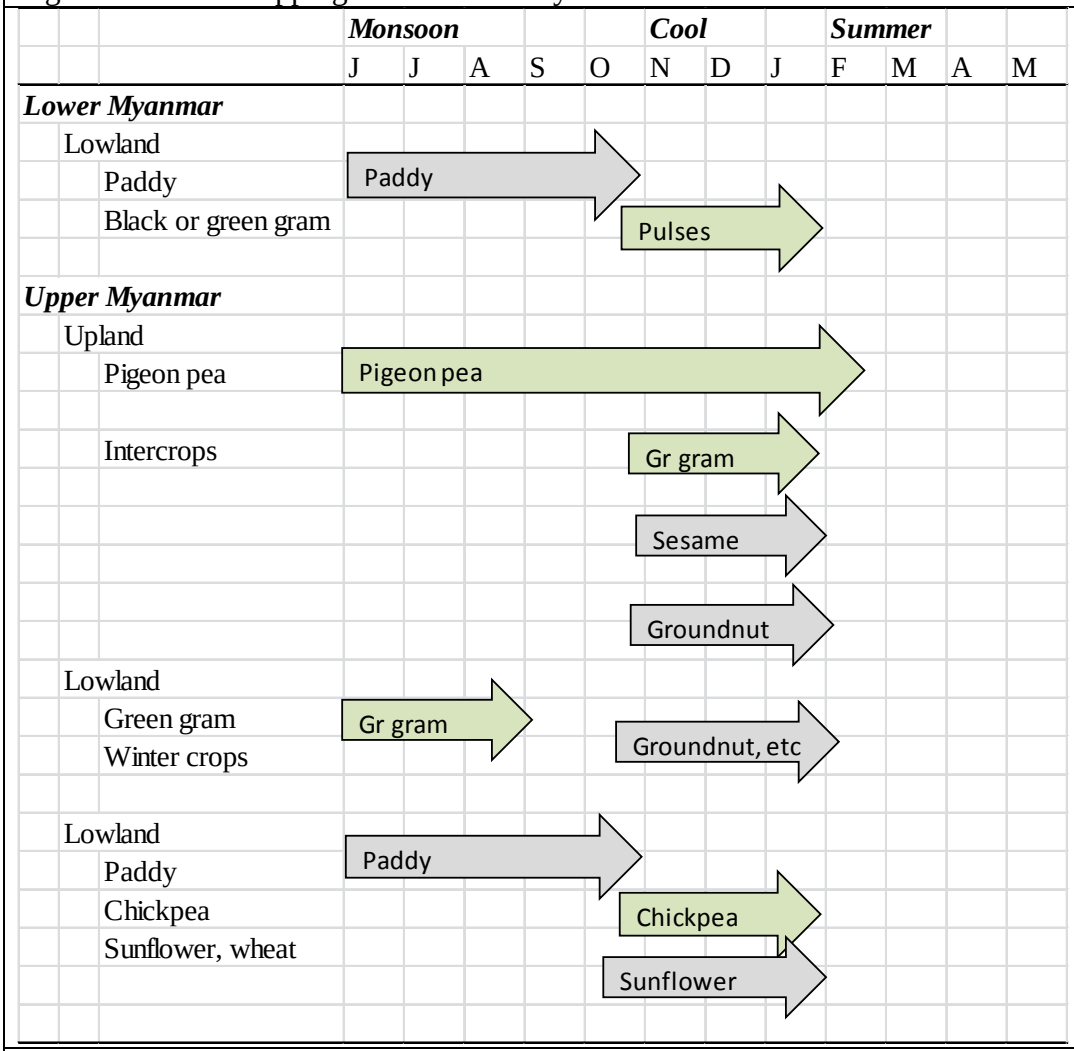
Green gram offers the largest diversity of cropping practices (Figure 5 and Table 8). Depending on the variety and land type available, farmers can grow green gram in the monsoon, in the cool season and even in some cases as an irrigated summer crop. In practice, farmers in Upper Myanmar grow about 75% of their green gram during the monsoon season (Table 9). This contrasts starkly with farming practices in Lower Myanmar, where farmers produce green gram almost exclusively as a winter season crop immediately after harvesting their monsoon paddy. As a result of this diversity in geographic and seasonal production, green gram offers a longer marketing season as well as more varied marketing circuits than other pulses. While most green gram from upper Myanmar gets sold through Mandalay for export to China, some finds its way south to Yangon for export to other Asian markets. Traders estimate that domestic markets absorb only 5-10% of national production of green gram. While it can be milled to make dahl, local entrepreneurs sprout some of it to sell as bean sprouts.

4.2.2 Farm production and utilization in the Delta Zone

Pulses in lower Myanmar are grown after monsoon paddy on residual moisture (Figure 5). Monsoon paddy harvesting, threshing, and subsequent land preparation are thus a crucial labor bottleneck affecting the amount of residual moisture available to the pulse crop. Soil type also plays into this equation, with heavier soils taking longer to drain before planting of pulses is possible but then subject to the risk of drying out and cracking before grain formation. Land allocation between the two main pulses, black gram and green gram, depends on farmers' perceptions of profitability, relative prices and risk preferences. Black gram is seen as the more robust crop, less susceptible to moisture stress and especially to insect damage. Green gram is perceived as more vulnerable and therefore needing careful, regular insect pest management. But green gram prices are higher than black gram, and the crop is seen as potentially more profitable for farmers who can supply working capital for inputs and manage the risk.

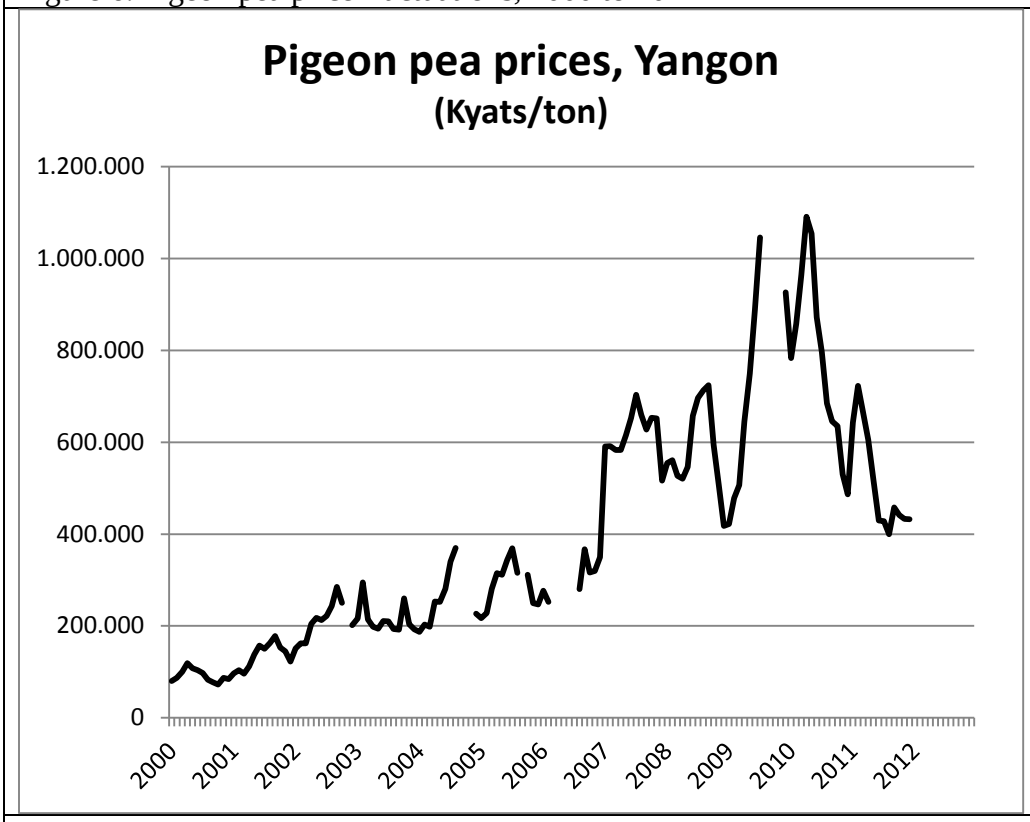
The green gram "pulse basket" of lower Myanmar comprises the townships of Thongwa and Kayan, known by traders for its high proportion of large-sized or "SQ" (special quality) grain suitable for the production of bean sprouts. This is the area where Okamoto (2008) carried out the first and to-date the most thorough study of the effect of pulse market liberalization on the rural economy. Farmers and traders have evolved a partnership over the years. Traders initially brought quality seed to the area and continue to keep back the best of the crop they buy to provide to farmers for next year's harvest. Farmers plant early, apply regular insecticide and foliar nutrient applications, and harvest individual pods multiple times so that only mature grains are threshed, thus preserving quality. Grain from this area is prized for the overseas bean sprout market.

Figure 5 . Pulse Cropping Calendars in Myanmar



Source: Field visits.

Figure 6. Pigeon pea price fluctuations, 2000 to 2012



Source: MOAI, DSG.

Table 8. Crop calendars for pulse production and trade

	May	June	July	Aug	Sept	Oct	Nov	Dec	J
Black gram									
Lower Myanmar							S	S/G	
India			S	G	G	H	H		
Chickpea									
Upper Myanmar							S	S/G	
India					S	S	S	G	
Pigeon pea									
Upper Myanmar	S	S	G	G	G	G	G	H	
India	S	S	S	G	G	G	H		
Green gram									
Lower Myanmar							S	S/G	
Central Myanmar	S	S/G	G	H	H				
Central Myanmar				S	S/G	G	H	H	
Central Myanmar	G	H	H						

Source: Etrade 2014 and field visits.

Table 9. Pulse area planted in Myanmar, by season and region (percent)

	Monsoon	Dry Season	Total
Pulse area planted, by region			
Lower Myanmar			
Black gram		100	100
Green gram		100	100
Upper Myanmar			
Green gram	75	25	100
Pigeon pea	100		100
Chickpea		100	100
Total green gram	25.5	74.5	100
Myanmar total area planted in pulses			
Black gram	0	40	40
Green gram	8	22	30
Pigeon pea	20	0	20
Chickpea	0	10	10
total pulse area	28	72	100

Source: MOAI (2010), DOA Munywa, MOAI (2013).

To the west and south of these districts, on the other side of the Ayawaddy river system, lies the township of Wakema, known for its small, matt green colored grain, destined for the Indonesian market. As one goes further north, black gram becomes increasingly predominant in the cropping systems as moisture becomes more limiting. Nevertheless, many farmers in the districts directly north of the green gram heartland, beyond Bago towards Nyaunglebin, are trying to make the switch to green gram to take advantage of its higher relative price. In 2013, green gram prices averaged roughly 35% more than black gram (Table 4).

Home storage and consumption of black gram or green gram remains very limited. Farmers face difficulty in storing the crop without spoilage. So they frequently convey their gram to a trader for storage straight after harvest with the price to be agreed later at time of sale. Home consumption beyond use for planting seed is rare, often limited to meals prepared for hired labor in the fields.

As indicated earlier, the key to pulse yield is time of planting, soil type (critical for moisture retention) and insect pest management. Harvesting at correct time of maturity is also important for grain quality, and threshing method is important for cleanliness. But labor, and sometimes mechanization services, are very scarce at the time of monsoon paddy harvesting. Farmers who have benefitted from access to equipment loans, or who have been able to purchase machinery from remittances, testify that the introduction of mechanized harvesting and threshing can save 7 – 14 days in turnaround time between paddy harvesting and planting pulses, more than paying for the additional cost of mechanized harvesting.

Another, complementary solution to this problem, especially for sandy soils, would be access to earlier maturing varieties. But apart from sporadic access to varieties from traders, or occasional access to seed from a government seed farm[2], farmers are deprived of access to improved varieties. There is no research station in lower Myanmar undertaking tests of improved varieties.[3] Another basic input to which farmers have no access is *rhizobium* inoculant. Ironically this used to be available from the DOA in the 1990s but no longer. Neither is it available from input retailers. Although adaptive research is necessary to verify, the use of *rhizobium* could complement or partially substitute for foliar nutrient sprays (currently used mainly by green gram farmers).

Farmers depend entirely on private sector input retailers for pesticide recommendations. For black gram, most farmers do not spray at all, or possibly just once. Green gram is subject to more intense pesticide applications. Farmers share information about which insecticides are most effective. There is no awareness of or training in integrated pest management techniques that could reduce costs (and therefore risk exposure) such as scouting or block spraying. The lack of research and extension on integrated pest management is a potential threat to continued access to high value overseas markets with strict pesticide residue thresholds.

For black gram, most farmers harvest the entire plant and transport it to a "threshing floor", a level area of dry, exposed earth (Photo 4). Threshing is done by ox cart or two-wheeled tractor. Winnowing is carried out by hand pouring threshed grain in front of an open tractor-engine powered fan. Grain obtained from this threshing process is very dirty.

Photo 4: Threshing Floor

Green gram generally receives more careful harvesting treatment, but some farmers are switching to harvesting whole plants due to labor costs. In the areas where farmers are switching from black to green gram, the practice of harvesting entire plants rather than individual mature pods continues. When green gram is harvested immature, the seed can quickly turn brown or yellow, compromising quality. Given the almost complete lack of access to improved varieties of pulses in lower Myanmar, the lack of access to rhizobium inoculant, and the lack of pest management instruction for farmers, it is highly likely that significant farm-level productivity gains could be achieved through improved input use and improved agronomic practices.

[2] One DOA seed farm we visited produced 12 baskets in 2012, in contrast to 2000 baskets of saved seed distributed to farmer clients by a single rural trader.

[3] Sein Hla Bo, Presidential adviser on agriculture, personal interview,

4.3. Structure of Pulses Value Chain: Post-farm

Just as there are differences at the farm level between production systems in Upper Myanmar and the Delta Zone there are also differences in the post-farm parts of the value chain. Figure 7 maps the value chains in each region, with Upper Myanmar on the right side and the Delta Zone on the left side of the Figure. Commodity Exchanges are referred to as CE in this Figure.

4.3.1. Post-farm marketing and value added processing in the Dry Zone

Pulse marketing in Upper Myanmar centers around the Mandalay Commodity Exchange and the roughly 2,000 pulse traders who operate there. Of these, about 20 traders export directly to China by truck, while another 200 large traders operate mills alongside their trading operations. The remaining 1,800 traders and brokers book smaller supplies which they funnel to international markets via the large export traders.

Marketing seasons differ slightly for the four major pulses. Pigeon pea, planted in May and June, enters the market beginning in December, roughly two months after the domestic supplies in India (Table 8). In 2013, pigeon pea prices peaked in the month of March (Etrade 2014). Chickpea, an exclusively winter crop, comes onto the market beginning in February and March. Green gram, because it is grown during all three cropping seasons, trades throughout most of the year in the dry zone (Table 8).

Links between the Mandalay and Yangon exchanges remain strong. All of the pigeon pea and chickpea exports transit exchanges in Upper Myanmar, often via Mandalay. The bulk of the green gram produced in Upper Myanmar gets exported north to China, via Mandalay, while the remainder heads south to Yangon for shipment to India and other Asian markets.

The export traders and brokers, based in Mandalay for the China market and in Yangon for India and elsewhere, are the key players in this marketing system. Although market participants rarely hold long-term stocks, traders estimate that short-term trading stocks (of 2-4 months in duration) are held throughout the system by exporters (40%), regional traders (30%) and large farmers (30%).

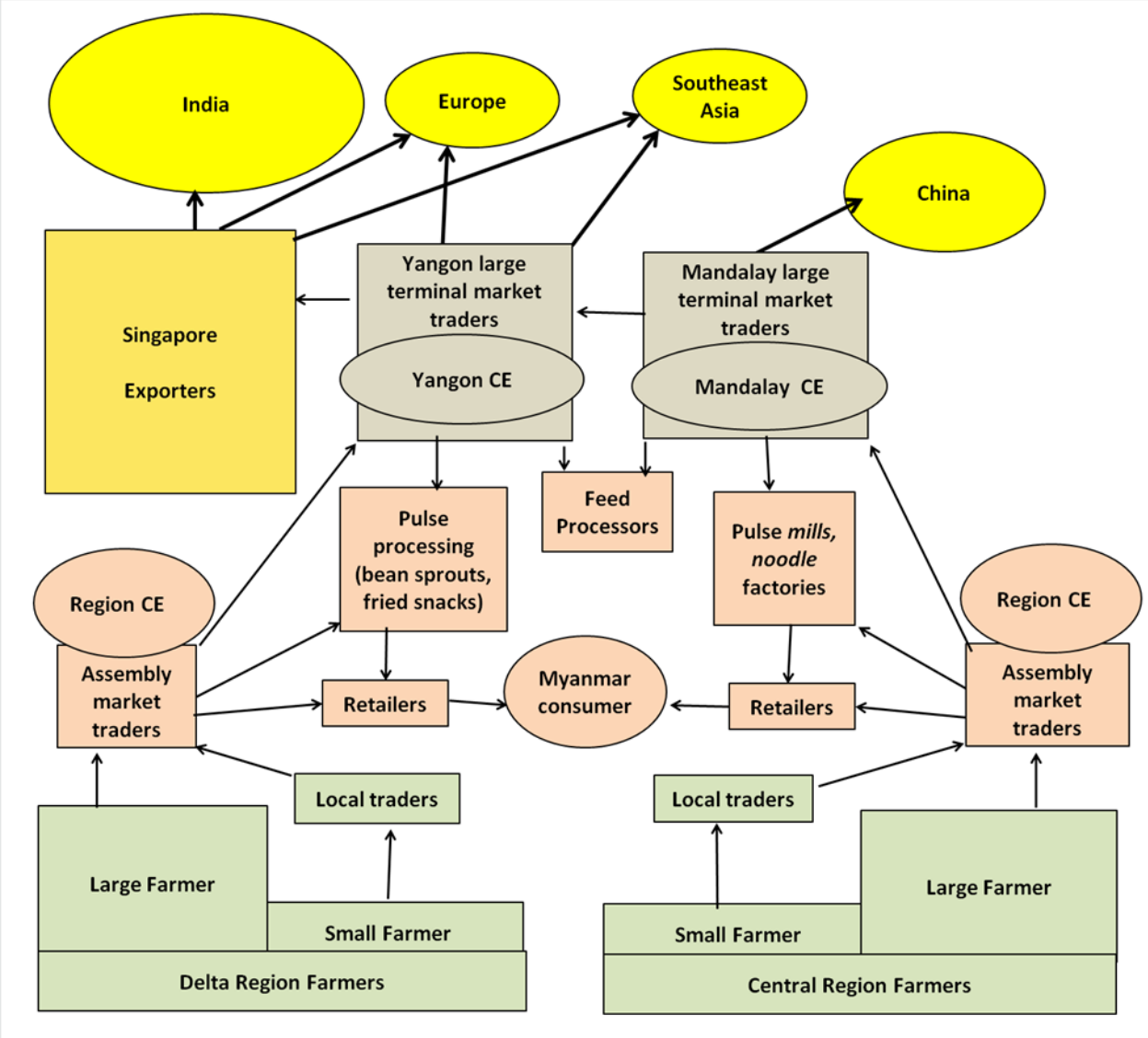
Traders at six regional commodity exchanges supply terminal market wholesalers in Mandalay while traders at another five in exchanges Lower Myanmar supply the trading floor in Yangon (Table 10). Commodity exchanges vary in their operation with a few conducting auctions and most functioning as meeting places where private trades are made and then recorded. All are membership based organizations with an annual membership fee. The larger regional traders operate warehouses. Smaller brokers, without financing and often with very limited storage facilities, serve as intermediaries linking farmers with traders on the exchange. On average, each exchange-based trader procures from 40-50 smaller village-based traders.

At the village level, farmers of varying sizes vie for these markets. Larger farmers and those living nearby the trading centers often sell directly to traders on the regional exchanges. Smaller farmers, however, depend on local traders and brokers to link them to the regional assembly markets. Farmers often develop long-term relationships with traders who market for them.

Nonetheless, we encountered several farmers who indicate that they have changed traders over time in an effort to improve performance.

Considerable turnover exists in the pulse trade, particularly among the smaller traders and brokers. In part, this turnover arises because historically the pulse trade had provided an opportunity for speculators with few alternative platforms. This phenomenon has dissipated in recent years as Yangon's property market now provides new opportunities for speculative capital. Given volatile prices, and accusations of market manipulation during the price spikes of 2006 and 2009, most traders agree that smaller traders frequently move in and out of the business.

Figure 7 : Pulse Value Chain Organization in Myanmar



Notes : CE = commodity exchange

Table 10. Geographic Distribution of Production, Assembly Markets and Export			
	Major Producing Regions	*Commodity Exchanges* and Other Key Assembly Markets	Export Marketing
Lower Myanmar			
Black gram	Ayeyarwady Bago East Bago West	*Hinthada*, *Danuphyu*, *Maupin*, Nyaung Tone, Wakema *Pyay*, Bago	Yangon → India
Green gram	Yangon Bago East	*Yangon*, Thongwa, Kayan *Pyay*, Bago	Yangon → India, Indonesia, etc
Upper Myanmar			
Green gram	Magway Mandalay Sagaing	*Magway*, *Pakokku*, *Aunglan* *Mandalay*, *Myingyan* *Monwya*, *Shwebo*	Mandalay → China
Pigeon pea	Sagaing Magway Mandalay	*Monwya*, *Shwebo* *Magway*, *Pakokku*, *Aunglan* *Mandalay*, *Myingyan*	Yangon → India
Chickpea	Sagaing Mandalay Magway	*Monwya*, *Shwebo* *Mandalay*, *Myingyan* *Magway*, *Pakokku*	Yangon → India
Sources : Field interviews, Etrade (2014), MOAI (2010)			

4.3.2 Market organization in the Delta Zone

Farmers sell either to village traders or to rural wholesalers. In either case, farmers have long standing personal, family and economic relationships with the traders they sell to. Most grain trades hands for cash, although some traders will take grain and store until the farmer is ready to sell at the prevailing market price. This model is seen as a win-win as it ensures the trader has commodity in stock to take advantage of a good offer, while the farmer is relieved of storage risk. Village traders sell to rural wholesalers or to regional wholesalers based in larger towns who are often members of a commodity exchange. Village traders may also sell to regional wholesalers if they are not distant from the town where the regional wholesaler is based.

Regional commodity exchanges have developed in Hintada, Danubyu and Pyay, and traders who are members of those exchanges trade on a daily basis with the Yangon commodity exchange. For Wakema, where green gram for the Indonesian market is sourced, the entire crop is purchased and transacted by approximately ten wholesalers with family roots in the area. Due to

the proximity of many green gram production areas to Yangon, regional wholesalers often sell directly to Yangon traders rather than marketing through a commodity exchange.

As in upper Myanmar, members of the Yangon commodity exchange can be either wholesalers or exporters, and may have their own representatives as members of regional exchanges. Apart from green gram in Nyaunglebin, which can be shipped to either Yangon or Mandalay (for export to China) depending on relative prices, most grain in lower Myanmar is purchased for export to India through the port of Yangon. Approximately 30 companies in Yangon have size and color sorting equipment to prepare cargo for export (known as "ready cargo"). They export on their own account or sell to Singapore-registered trading companies on an FOB basis. Singapore-based companies act as "honest brokers" between Myanmar traders and Indian buyers, but are not allowed to purchase in local markets except on an FOB basis. A handful of export companies specialize in top quality produce sorted to meet exact specifications, including traceability requirements, for European and other high value buyers. They sell reject grain, after size and color processing for export, along with by-products from pigeon pea milling to local feed processers. Wholesalers also sell small quantities of pulses to domestic value added processors.

A weak point in the domestic marketing channel is the lack of effective transmission of quality criteria from exporters to farmers. The pulse crop is often handled (emptied, inspected and re-bagged) multiple times from farmer to village trader to wholesaler, with higher and lower qualities sometimes being mixed to avoid penalties from exceeding threshold size tolerances. Almost all value-added processing (as opposed to value obscuring) occurs at the exporter level. Exporters address this weakness by price discrimination on the basis of origin (grain from Hintada is known to be of poor quality due to poor harvesting practices) or knowledge of individual trader's historical record of ability to secure quality produce.

Another factor militating against downstream investment in quality discovery and preservation is the very short trading season – just two months. Traders don't want to invest in size screening equipment for a crop they only trade two months a year. Rural wholesalers would prefer to invest resources in paddy milling which they see as a year-round value added activity with greater upside from seasonal price gains to storage.

4.4. Market Behavior

Close communications between Yangon and Mandalay lead to tight linkages between these two terminal export market hubs and among the regional assembly markets that supply them. Most traders on the Yangon and Mandalay commodity exchanges have established offices on both exchanges or, at a minimum, tight working relationships with traders on the sister exchange. As a result, prices in the interior markets closely follow the export prices prevailing in Yangon and Mandalay. Given improved cellphone access and improved availability of price information, spatial price spreads generally reflect costs of movement between the various feeder markets and the export hubs (Table 11). Green gram, which trades in various sizes and quality levels, displays wider price spreads than other pulses, as much as $100 for green gram compared to the more common $40 ranges for pigeon pea and black gram (Table 11). Quality differences

account for about $30 of the green gram price spread. In January 2014, the $966 green gram price prevailing in Mandalay for ordinary quality, large-sized green gram (Table 11), while first quality, large-sized green gram sold for $994. Size differences intervene as well, with large grains attracting a price premium for the export markets where the large grains are preferred for making bean sprouts.

Over the past 25 years since private market liberalization, industry leaders indicate that marketing margins and the number of steps in the marketing chain have fallen as a consequence improved telephone communication, better market price information and increased scale of the trade. While farmer to exporter involved 3-4 sequential transactions during the early years of the pulse market liberalization, that number now lies closer to 2-3 steps (Figure 5). Increased trading volumes, growing numbers of intermediaries and improved price information have all contributed to increased market efficiency.

Table 11. Spatial Price Spreads between Key Assembly Markets and Export Hubs in Yangon and Mandalay, January 2014 (US$ per ton)

	Black gram	Pigeon pea	Green gram*	Chickpea
Upper Myanmar				
Monywa		562	897	520
Pakokku		568	902	514
Mandalay		565	966	513
Lower Myanmar				
Pyay	575		946	
Hindatha	595		916	
Yangon	613	600	1095	
Mumbai	671	642		

* Note that size and quality differences lead to wide variation in GG prices.

Source: Etrade (2014)

Unlike in the early decades, price information now circulates freely throughout the marketing system. Most exchange traders subscribe to the E-Trade financial services in order to track Mumbai, Yangon and Mandalay pulse prices. Smaller traders and brokers see the prices posted daily on each of the regional commodity exchanges. A study of pulse export markets in the year 2000 found that only 25% of town wholesales in the major pulse-producing zones had access to export market price information (MOAI 2014). In stark contrast, during our market interviews in 2014 we found most wholesale traders well aware of Yangon and Mandalay export prices. Expansion of cell phones and the growth of public and private market information services have improved knowledge of export and terminal market prices throughout the marketing system.

Currently, a cohort of large domestic trading firms export pulses directly from the country's main terminal markets. In Mandalay, about 20 large Myanmar traders funnel cross-border exports by truck north to China, while another 100 or so large bean and pulse traders in Yangon

export internationally via ship. In addition to these market leaders, several hundred additional bean and pulse trading firms operate on the Mandalay and Yangon exchanges. This complex network of large and small domestic trading firms sources pulses from rural areas and delivers them to warehouses in Yangon and Mandalay, where terminal market exporters prepare them for inspection and export. Another 2,000 to 3,000 smaller scale traders and brokers operate on the regional exchanges in the growing regions (Table 12).

Table 12. Rough Estimate of Numbers of Actors Operating at Various Stages of the Pulse Value Chain

	Lower Myanmar	Upper Myanmar	Total
Export Traders, Yangon and Mandalay			
International export firms	20		20
Large domestic exporters	100	20	120
Large domestic traders	300	200	500
Small traders and speculators	500	1,800	2,300
Processing for domestic markets			
Pulse mills	Few	300	300
Noodle factories	Few	50	50
Other processing (sprouts, fried snacks)	Many	500	500
Assembly markets			
Exchange-based traders	300	800	800
Brokers	6-900	1,200	1,200
Rural areas			
Local traders	10000+	10,000	20,000+
Farmers (million)	1.8	1.2	3.0

Source: field interviews.

Together, these domestic traders form the Myanmar Bean and Pulse Traders Association (MBPTA), which represents the interests of domestic trading firms to government and to abroad. In the early days of pulse market liberalization, the bean and pulse traders association served an important role in helping to legitimize this formerly illegal trading activity, organizing and regulating trading conditions through regional commodity exchanges, and representing trader interests to government.

Export marketing channels appear to be competitive but costly. By competitive we mean that individual players in the export trade do not appear to be able to manipulate prices in their favor. But high trading costs, especially but not limited to transport costs, result in high price spreads

between domestic and international terminal markets. Table 13 provides a breakdown of the $175 per ton price spread for large green gram between Mandalay and Ruili. The apparent net margin accruing to traders (before domestic finance charges, management and overhead cost) is only positive if import duty to China can be successfully avoided. The fact that the trade is active indicates that duty is avoided but this in turn results in unnecessary transactions costs.

Table 13: Breakdown of price spread for green gram between Mandalay and Ruili.

	US $/ton			
Mandalay price	1062			
Ruili price	1237			
Price spread	175			
Price Spread Components			Price Spread Share (%)	
Export costs ($/tonne)	247		Transport share	34
Export documentation	13		Myanmar duty share	14
Myanmar export tax (commercial tax)	25		China duty share	79
Transport Mandalay to Muse	44		Other transactions costs	14
Yunan import duty (official rate 13%)	138			
Transport Muse to Ruili	16			
Forex costs	11			
Apparent net trader margin with import duty ($/tonne)	-72			
Apparent net trader margin no import duty ($/tonne)	66			

Source: Etrade and trader interviews

Historically, several dozen international trading firms have served as intermediaries through whom ocean-based exports via Yangon have transited. Today in Yangon, about 20 international firms have established offices from which they serve as export traders and brokers. In the early days of the pulse market liberalization, these international firms provided two key services to local traders: • contacts with pulse buyers abroad (particularly in India), and • financing (in an era of restricted international fund transfers). Many of these firms, based in Singapore where most of Myanmar's exports trans-shipped, opened domestic offices to service the rapidly growing pulse export trade. Myanmar's Ministry of Commerce has forbidden direct purchase of pulses in Kyat by these international firms. As a result, a symbiotic relationship has growth up, through which the international trading firms contract with large MBPTA firms to procure and prepare required export quantities for export. Inspection of each shipment's quality and quantity specifications, by one of two international inspection services, provides the exporter with certification for each shipment. In normal commercial practice, this certification would trigger payment based on a letter of credit (LOC). In practice, however, most trade takes place through telegraphic transfers of funds, either in advance or upon receipt of the inspection certificate, by the export brokers to the large Myanmar trading firms.

Due to the stringent collateral requirements of banks in Myanmar, the international export brokers often advance payment to local trading counterparts in order to procure timely quantities

and qualities required. However, these advances require trust and experience. In several instances, widely discussed in the trade, Myanmar traders have defaulted after receiving an advance, absconded with the funds and failed to deliver the merchandise promised. In 2006, a politically connected trader failed to deliver on a $40 million contract, triggering a panic in the market. In 2009, four traders served jail time for defaulting on pulse export contracts. Most recently, a $2.5 million default required government involvement to secure warehouses. In February 2014, in response to this risk of default, the international exporting firms formed their own organization, the Overseas Agro Traders Association of Myanmar (OATAM). The Yangon-based representative of Tata International serves as the first president of OATAM, whose 16 founding members indicate they account for 85% of Myanmar's pulse exports (Tata 2013). As a result, two key private sector organizations currently monitor the Myanmar pulse trade

Speculative behavior by pulse traders poses market risks highlighted by many of the pulse traders we interviewed throughout Myanmar. In fact, some traders specifically distinguish three categories of market participants: "traders", "brokers" and "speculators". Given sharp swings in Indian pulse prices, and similar peaks and dips on the Myanmar exchanges (Figure 5), speculative behavior offers potential rewards for traders with early knowledge of future price movements. Some industry participants believe that efforts to manipulate pulse prices may have aggravated domestic price swings. Although this potential has likely diminished as price information flows have improved, many traders remain convinced that speculation poses a real risk.

4.5. Institutions and Policies Affecting Pulses

The Government of Myanmar has remained largely laissez-faire, letting the pulse trade develop based on private sector initiative and incentives, with the important exception that foreign companies are not allowed to trade in local currency on their own account. The reduction in the commerce tax rate on exports from 10% to 2% has increased incentives for all players in the sector and, since the domestic marketing system is intensely competitive, it is likely to have resulted in higher farm-gate prices for farmers.

The Ministry of Agriculture and Irrigation (MOAI) conducts research on pulse new varieties – particularly green gram and pigeon pea and chickpea. The Department of Agricultural Research (DAR), however, remains highly constrained by limited budgets and staffing. They have relied primarily on testing international varieties from Indian and international research centers. This early work, between 1988 and 2004, resulted in the release of 1 new variety of black gram, 5 new varieties of green gram, 4 pigeon pea varieties and 1 new variety of chickpeas (Khin Than Nwe 2008). DAR began a breeding program in 2003, leading to the release of two additional green gram varieties, one in 2010 and one in 2013. International centers such as the International Center for Research in the Semi-Arid Tropics (ICRISAT) have regularly supplied genetic material for pigeon peas and chickpeas. However green and black gram remain the remit of the Taiwan-based Asian Vegetable Research Development Center (AVRDC). Because of AVRDC's base in Taiwan, Myanmar researchers have not been able to formally access material from AVRDC, apparently due to political sensitivities from China. The DAR has no research

facilities in Lower Myanmar, and on-farm testing of improved varieties is rare. Given the lack of systematic on-farm testing and demonstration of improved varieties we hypothesize that only a small proportion of farmers have been exposed to improved germ plasm that could potentially increase yields.

Access to quality seed supplies remains a problem for Myanmar pulse farmers. Acute funding constraints at MOAI have limited the DOA's capacity to supply cleaned, certified seed to farmers. Although pulses are close-pollinators, resulting in no genetic loss from recycled seed, many bacterial and fungal diseases are transmitted on seed coatings. As a result, agronomists recommend that farmers purchase clean, certified seed roughly every five years to maintain yields. Given DOA limited capacity in this area, private sector traders have largely served this role of seed suppliers to Myanmar's pulse farmers. Seed supplied by traders is neither certified nor based on known genetic qualities – it is simply commercial crop with desirable size and color that is correctly stored. No traders that we spoke to reported obtaining access to seed of improved varieties through DOA.

With the exception of input suppliers, primarily pesticides and to a lesser extent foliar fertilizers, farmers have no access to extension recommendations on pulse crop management. Farmers make choices based on trial and error, exchanging information with neighbors.

In the private sector, two sector trade associations serve to organize the traders, exporters and millers. The Myanmar Bean and Pulse Trader's Association represent domestic Myanmar traders, while the Overseas Agro Traders Association of Myanmar (OATAM) represents the interests of foreign-based pulse exporters with corporate representation in Myanmar (Photo 5). The two trading organizations share common interests in growing pulse export volumes. However, their interests diverge in determining a fair share of the export price paid to local traders and farmers. The roughly 3 million farmers growing pulses in Myanmar remain largely unrepresented in policy debates.

Photo 5: Overseas Agro Traders Association of Myanmar (OATAM)

Regulations on international financial transactions and the Ministry of Commerce's prevention of direct Kyat-denominated purchases of pulses on the domestic market have forced international firms to procure through local Myanmar-based traders. Because local traders have very limited access to capital from the local banking system international firms often have to make advance payment to local firms, exposing them to additional risks. Costly defaults on the part of local traders led to the recent formation of OATAM to lobby for financial reparation in the case of fraud.

4.6. Key Lessons from the First Wave of Pulse Export Growth

Myanmar's private marketing system has shown tremendous responsiveness as well as a capacity to adapt in response to changing incentives. The growth and development of the commodity exchange system has resulted in an organized trade with large numbers of traders and well-publicized market prices throughout the system. The emergence of a fee-based private market information service has clearly helped to improve information flows throughout the system. Yet Myanmar pulse export markets have diversified only to a very limited degree and remain heavily dependent on a single, volatile, raw quality commodity market - India.

The convergence of three major forces propelled the first wave of pulse market development in the 1990s and early 2000s: • rising pulse prices; • a simultaneous fall in oilseed prices, which compete for the same cropland in Upper Myanmar; and • growing demand for pulses in India. In the past decade, however, these three trade-promoting winds have blown with less consistency, they have become less synchronized, and indeed sometimes begun to move in opposite directions. The perfect storm that propelled the first stage of pulse market growth has now dissipated. As a result, pulse exports have stalled. Restoration of growth will depend on a resuscitation of these forces (through development of new export markets or higher prices, perhaps through increased valued added) or the identification of alternate sources of power.

One notable absentee during the first wave of pulse market growth has been on-farm productivity. Area gains have propelled farm supply response, while on-farm productivity has remained largely stagnant over the past 30 years (Figure 3). Given growing competition for cultivable land, even in the cool season using residual moisture, and rising rural wage rates, a farm-level productivity revolution is essential for Myanmar to maintain a competitive position in world pulse markets.

5. Looking Forward: Second Wind or Winded?

The global market for pulses is set to expand steadily in quantity and value terms for several decades. Not only is India's population expanding, where pulses are the main source of protein for more than half the population, but consumers in many wealthy countries (e.g., Europe, Japan, Taiwan, South Korea) are seeking to consume more vegetable protein as part of a healthy diet that reduces the incidence of cardiovascular disease. Even in poorer countries there will be increased demand for processed pulse products to substitute for increasingly costly meat protein sources. Unlike in the past, Myanmar will not retain its position as a global giant with the public sector just sitting on the sidelines. The government must recognize that pulses are a strategic sector and engage with the private sector to ensure that public investments and policies are in place to support modernization and raise productivity throughout the value chain. If these investments are made now Myanmar can expand its role in global trade to the benefit of millions of rural farmers for several decades to come. If not, the sector will gradually decline as high price volatility discourages farmers and lack of competitiveness in high value markets discourages traders and exporters, and other countries already making these investments (such as Canada and Australia) seek to take advantage of Myanmar's weakness.

In general, we see three avenues for propelling Myanmar's pulse markets forward to increasingly higher levels:

- expanded export earnings (from new markets and higher value added products);
- improved farm productivity; or
- increased domestic demand.

The following discussion explores each of these options in turn.

5.1. Opportunities for export growth

Over the past decade, India has served as the world's largest pulse producer as well as its largest consumer and importer. On average, over the past decade, India has accounted for nearly one quarter of all world pulse imports (Table 14). Given its high population of vegetarians, roughly 500 million strong, India will likely remain the world's dominant consumer of pulses for the foreseeable future. Despite comparable populations, India has imported 2.3 million tons of pulses annually over the past decade compared to only 400,000 tons for China, Myanmar's closest alternate outlet.

Over time, India's demand for pulse imports has increased, particularly since 2000, as domestic production has stagnated in the face of growing population pressure and domestic demand (Figure 8). Yet annual import volumes fluctuate considerably from one year to the next. During poor harvest years in India, Myanmar pulse exports surge, as they did in 2008. Conversely, a bumper harvest in India (or policy changes favoring domestic pulse production), cause India's demand for imported pulses to stall. This scenario played out in 2013 when India stopped importing Myanmar chickpea, leading to a glut in local markets and a slump in domestic prices despite the high domestic consumption. Indian traders have also been sourcing increasing quantities of pigeon pea from countries in Eastern and Southern Africa (Malawi, Tanzania, Mozambique) which have actively promoted improved varieties to take advantage of the market window prior to India's local harvest.

Reliable access (with decreased volatility) to the Indian market, thus, remains a key to future strong export markets for Myanmar pulses. In principle there is no reason why Myanmar should not be able to export processed rather than raw pulses to India. This would reduce shipping costs per unit value added, improve quality incentives for Myanmar farmers, and increase the availability of nutrient-rich husks for local livestock feeds. However, traders have complained that Indian importers demand only raw pigeon pea, black gram and green gram, which they process in their own mills and use byproducts for their own, large dairy industry. Myanmar traders claim that Indian import duties on processed pulses place them at a price disadvantage in trying to sell processed dehulled, split pulses.

Given the growing importance of Indian policy on pulses, Myanmar traders may need assistance from Myanmar's diplomatic missions abroad. Indian companies will certainly want reciprocal access to investment opportunities in the domestic trading and processing segments in Myanmar. Myanmar diplomats may, therefore, need to highlight the reciprocal benefits to be derived from Myanmar access to processed pulse markets in India. Other strong candidates for market development in the region include neighboring Bangladesh and Pakistan (Table 15).

Higher value and value added markets also hold some potential for growth. Currently, Myanmar exporters clean and sort by size only 35% of green gram and 10% of pigeon pea exports (Kyaw Myint 2013). In recent years, forays by large Myanmar traders have focused on seeking out and expanding high value niche markets. They have achieved the most success with large-sized green gram preferred for making bean sprouts in many of the wealthy Asian countries. Europe is an important potential market for the future with high returns for meeting quality and traceability requirements.

Table 14. Top World Importers of Pulses, (average import share 2000 to 2011)

Country	Import share
India	22,9%
Spain	5,7%
Egypt	4,3%
Bangladesh	4,2%
Pakistan	4,2%
China	4,1%
Italy	3,8%
Belgium	3,0%
United States of America	2,6%
United Kingdom	2,1%
Netherlands	2,0%
United Arab Emirates	1,9%
Algeria	1,8%
Cuba	1,8%
Brazil	1,7%
Turkey	1,6%
Sri Lanka	1,6%
Mexico	1,6%
Japan	1,5%
Others	27,6%
Total world imports	100,0%

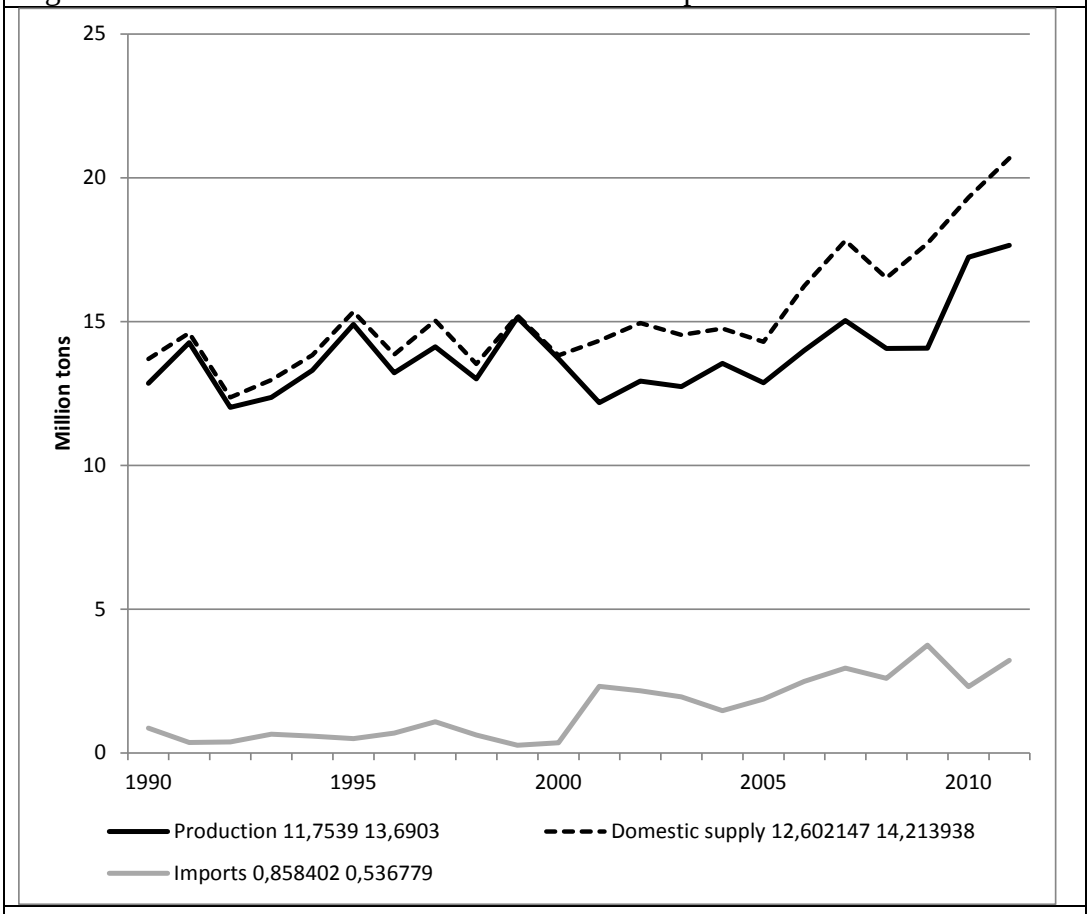
Source: FAOSTAT.

Table 15. Per capita pulse consumption in surrounding countries, 2011

	Pulse consumption (kg/person/year)
India	14.2
Pakistan	6.4
Bangladesh	3.9
Malaysia	3.2
Thailand	2.8
China	1.1

Source: FAOSTAT.

Figure 8. Trends in India's Pulse Production and Imports



Source: FAOSTAT.

Expanding the supply of quality value-added pulses will require investment in storage (inventory) as well as processing facilities to ensure year round supply to foreign customers. To make this possible, foreign companies need to be allowed to trade in the domestic market to purchase and store locally on their own account to ensure adequate raw material supplied to make investment in processing facilities profitable, Similarly local traders require access to inventory credit from the local banking system, and export credit guarantees, in order to compete on a level playing field with foreign companies once they are allowed to trade domestically. Opening up the domestic pulse market to foreign investors, while ensuring access to equivalent financial services for local traders, will enhance the level of investment and liquidity in the market and provide more stable and consistent price and quality incentives to Myanmar farmers.

5.2. Prospects for increasing productivity

Myanmar traders and farmers both emphasized the importance of raising farm productivity if Myanmar is to remain competitive in international pulse markets. Given currently low yields, of around 1 tons per hectare, scope for increasing productivity remains considerable. Improving

genetic material will require increased funding for DAR researchers and improved access to new breeding lines of gram from AVRDC.
Agronomic research likewise remains critical. Time of planting is critical for the post-monsoon cool season crop which relies on residual moisture. In the delta settings where gram follows monsoon paddy, mechanical harvesting and threshing offers one possibility for speeding rice offtake and enabling earlier planting of the subsequent pulse crop. Earlier maturing varieties will also expand the options for farmers who cannot afford timely access to mechanization services. In some systems, direct seeding into paddy fields is possible, though this requires proper agronomic trials to establish optimal feasible conditions under farm conditions.

Integrated pest and improved soil fertility management practices may offer scope for increased productivity while ensuring pest residues remain at internationally accepted levels. Inoculations of *Rhizobium* may also prove economically viable, though these too will require rigorous testing and evaluation under on-farm conditions.[4] Healthier pulse crops will in turn leave higher residual nitrogen for the following year's paddy crop.

Seed supply remains a critical yet long-neglected problem among pulse farmers. Resource constraints at DOA have resulted in private sector pulse traders and farmers taking charge of seed retention and supply. In addition to a need for a broader range of improved varieties, improved seed supply systems will be essential to disease control efforts among pulse farmers.

As a general guide a country should invest approximately 2% of the value a sector contributes to agricultural GDP. Thus an investment of at least $20 million annually in varietal development and crop management improvement would be justified even at current export levels.

In order to identify the most promising avenues for boosting on-farm productivity among pulse farmers, a joint diagnostic assessment by international legume agronomists and MOAI staff would offer a promising point of departure. Industry sources we interviewed repeatedly identified increased farm productivity as a critical requirement for ensuring Myanmar's future competitiveness in international pulse markets.

[4] The response of pulse yields to rhizobium inoculant depends on specific soil conditions as well as selection and correct application of inoculant. Hence it is difficult to generalize from research conducted in other countries in the region. In neighboring Bangladesh, for example, the use of inoculant has been found to be effective in raising green gram yields but not in Vietnam.

5.3. Prospects for increased domestic utilization

Despite high levels of pulse consumption in neighboring countries such as India and Bangladesh, Myanmar households consume only limited quantities. Apart from chickpeas, pulse consumption remains very limited (Table 2). Value added products such as noodles, bean sprouts, high-protein flours and various fried snacks offer prospects for possible market growth (Photo 6).

Photo 6: Bean sprouts for sale, Yangon

Given the importance of livestock in Myanmar's dry zones, efforts to increase processing would offer important byproducts for feed industry. Indeed, we witnessed many examples of small-scale dairy production in zones where pulse mills operated.

Since consumption habits change slowly, experimentation and promotion with alternative processed products will likely require cooperation between Myanmar's bean and pulse traders, the chamber of commerce and the hospitality industry to develop and promote pulse-based products. Foreign investors could play a role here in helping Myanmar to update technologies and product ranges on offer.

6. Conclusions

Private sector initiatives by Myanmar's traders and farmers have grown the country's pulses into a billion dollar export industry over the past 25 years. The fortuitous historical convergence of multiple favorable stimuli – the opening of the Indian market, rising domestic pulse prices, and simultaneously falling oilseed prices – favored and enabled this growth, which occurred with limited government interference or involvement.

A second wave of pulse expansion appears possible, although it will require more active public support, particularly in breeding and agronomic research. Unlike hybrids, closed-pollinating crops such as pulses enable farmers to recycle seeds from one year to the next. As a result, while private seed companies often invest heavily in developing hybrid varieties, which require annual seed purchases by farmers, they have little incentive to invest in varietal development for closed-pollinating crops such as pulses. Public research, therefore, becomes critical in both breeding and agronomic research. Moreover, clean seed supplies and certification systems will require ramped-up government capacity in this area.

Finally, diversification into high value new export markets requires encouragement of foreign direct investment into the processing sector, which in turn requires allowing foreign countries to

purchase raw material domestically in local currency. This will increase liquidity at peak marketing times and provide stronger incentives for quality. To ensure that local traders and processors can compete on a level playing field they should also have access to bank credit and export guarantee services. While exploration and access to new international markets may well require diplomatic involvement, this will be especially important in the case of the Indian market, to support private sector overtures and efforts at expanding quantities and value added in pulse exports to that country from Myanmar.

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Annex 1. Rapid Appraisal Field Methods

Annex Table A.1. Field visit destinations, February and March 2014		
	Markets visited	Village tracts visited
Upper Myanmar	Mandalay* Monywa* Pakokku* Magway*	 Lezin East Chaw Kau Se Ywa
Lower Myanmar	Yangon* Hinthada* Zalon Thanlyin Kayan Wakema Kyuak Ta Khar	 Tha Yet Kone Byin Gyar Gyi Sitpinkwin Thae Kone Kyar Kite Myaung Konelayyoe
* Official exchange.		

Pulse Trader Interview Guide

Goal: 3 exporters, 3 large traders, 3 small traders, 3 millers in each location; wholesale market, retail market visit to assess local demand for pulses

Local market profile

0. When did this exchange open?
1. Describe population of pulse traders: # exporters, large traders, small traders,
2. Requirements for joining the exchange
3. # warehouses stocking pulses; # mills
4. Major procurement zones
5. Major destination markets
6. Freight costs to major destinations
7. Price comparisons today: local market vs Yangon/Mandalay
8. Price seasonality:

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Price												
Qty												

++ = high

‘-- = low

Blank = negligible quantities sold

3. How is assembly structured?

Individual traders

1. Trader history
    When first trade pulses?
    Why?
    What other products do you trade?
    Why?

2. Trading seasonality:

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Qty												
Price												

++ = high

‘-- = low

3. Trading networks
    Whom do you buy from?
    From what region?
    Whom do you sell to?
    Selling price?
    Who transports from seller to you?

4. Trade financing
    Cash payment to suppliers?
    When?
    How financed? a) own capital; b) financed by larger trader; c) borrowing?; d) credit?
    When do you receive payment?

5. Storage
    Do you have storage facilities? Where?
    How long do you hold physical commodities before selling?
    How many storage sheds in your area?

6. Milling
    How many mills in your area?
    What milling required for each pulse?
    Milling before storage? Or after?
    Does milling affect length of time you can store pulses?
    Who owns mills? Traders? Or independent milling businesses?

7. Local markets
    Any local consumption of pulses?
    What form?
    What %: consumed locally; exported to China? sold to Yangon for export?

8. Future demand for China
    Can it increase?
    By how much?
    What products?

MDRI Farmer Field Interview Guide - Myanmar Pulses

VOLUNTARY PARTICIPATION – NO PERSONAL INFORMATION WILL BE COLLECTED

Date: _____ Interviewer _____

Division: _____ Township _____ Village _____
GPS coordinates: _____

Farming system overview

1. Land owned and cultivates
   Owned ____ acres
   cultivated ____ acres

2. Major cropping systems by land type

Land type	Acres	Monsoon crops	Winter crops	Summer crops
a. upland, Y1				
b. upland, Y2				
c. lowland				
d. river edge				

Pulse Production

2. Pulse plots, crop rotations and intercrops
a. how much area did you plant in pulses during 2013/14? _____
b. on what type of land do you grow pulses?

Pulse	Area	Land type	Season	Intercrop?	Rotation
Green gram					
Black gram					
Pigeon pea					
Chickpea					
Others					

3. Pulse history
a. When did you start growing pulses? BG, GG, PP, CP,other pulses (OP)
b. If you didn't' grow pulses, what other crops could you grow on these plots?
c. What was your cropping allocation 10 years ago?
d. Why have you increased/decreased specific crop areas?

4. Pulse cropping calendar, 2013/14

Major crops	Sowing Time	Harvest time	Production	Seed	Cons	Sales
BG						
GG						
PP						
CP						
Sesame						
Groundnut						
Others						

5. Cost of production

	Pulse 1	Pulse 2		
Area				
Variety				
Seed source				
Land prep method				
Planting method				
Input costs				
Input financing method				
Irrigation				
Harvesting method				
Production (kg)				
Sold (kg)				
Consumed (kg)				

Marketing

6. How many pulse buyers operating in this area?
    a. this year?
    b. more or less buyers in last 5 years?
8. Where do you sell?
    a) Buyer comes to farm;
    b) farmer goes to market place? Where?
9. Sell all at once or in small batches?
10. Best time to sell
11. What month did you sell?
12. Reason for actual timing of sale
13. price received
14. Price changes from last 5 years
15. How choose buyer?
16. Any advance payment for crop
17. Input financing?
18. Source of price information
19. Are pulses a good crop to grow?
20. What crop will you plant next season?
21. Why?

Annex 2. Supplementary Tables

Annex Table A.2. Cropping Calendars for Major Myanmar Crops and Production Zones

	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April
Black gram												
Lower Myanmar							S	S/G	G	H		
India			S	G	G	H	H					
Chickpea												
Upper Myanmar							S	S/G	G	H	H	
India					S	S	S	G	G	H	H	
Pigeon pea												
Upper Myanmar	S	S	G	G	G	G	G	H	H			
India	S	S	S	G	G	G	H					
Green gram												
Lower Myanmar							S	S/G	G	H	H	
Central Myanmar	S	S/G	G	H	H							
Central Myanmar				S	S/G	G	H	H				
Central Myanmar	G	H	H								S	S/G
Cowpea												
Upper Myanmar												
Monsoon paddy												
Lower Myanmar	S	S/G	S/G	S/G	S/G	H	H	H				
Upper Myanmar			S	S/G	S	S	H	H	H			
Southern Shan	S	S/G	S/G	S/G	S/G	H	H	H				
Summer Paddy												
Lower Myanmar							S	S/G	S/G	G	H	H
Upper Myanmar	H	H							S/G	S/G	S/G	S/G
Southern Shan	H/G	H	H								S	S/G
Sesame												
Upper Myanmar	S	S/G	G	H								
Upper Myanmar					S	G	G	H				
Upper Myanmar	G	G	H									S
Groundnut												
Lower Myanmar							S	S	G	H	H	
Upper Myanmar	S	S/G	G	G/H	H							
Upper Myanmar				S	S/G	S/G	H	H				
Maize												
Lower Myanmar		S	S/G	G	H		**S**	**S/G**	**G**	**H**		
Central Myanmar		S	S/G	G	H							
Hilly zones												

Source: Etrade 2014 and field visits.