

## Input Use and Channels Among the Horticultural Producers of Maputo

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Using data from the 2013 horticultural baseline study conducted as part of the trilateral partnership between Brazil, the United States, and the Mozambican Agricultural Research Institute (IIAM), this *flash* explores producers' input purchase channels in terms of their formality, frequency, location and value, as well as their methods of irrigation. Principal findings are: (1) Among producers of the *zonas verdes* of Maputo, the most common source for purchases of seed, pesticide and inorganic fertilizer are informal *comerciantes ambulantes*, (2) seeds are farmers' largest input cost (compared to pesticides and fertilizer) but farmers generally have low levels of knowledge about the varieties of seeds they use or the benefits of these varieties compared to others, (3) farmers with more land under cultivation and more technological capacity (a) use more inputs and (b) are more likely to purchase these inputs in a formal channel rather than an informal channel, and (4) among users of water pumps in Moamba and Boane (58%), spray or drip irrigation is used by less than 4% of households, whereas irrigation with water pumps is nearly non-existent in the *zonas verdes* (0.7%). This leads to large labor demands in both of these areas for regular manual irrigation or trench-digging (in the case of gravity-fed irrigation methods).

**INTRODUCTION:** High production value per unit land area makes horticulture particularly attractive as a source of income for land-constrained farmers. Yet major challenges of horticultural production marketing relate to the cost and knowledge needed to acquire quality inputs. How much, which, where and from whom a producer purchases the seed varieties, fertilizers, and pesticides used on her field(s), as well as what method of irrigation is used, all affect the productivity and prospects for a successful commercial harvest. Using data from the 2013 baseline survey of horticultural farmers in the *zonas verdes* and districts of Moamba and Boane in the province of Maputo, this *flash* characterizes producers' input purchase channels in terms of their formality, frequency, location and value and their methods of irrigation.

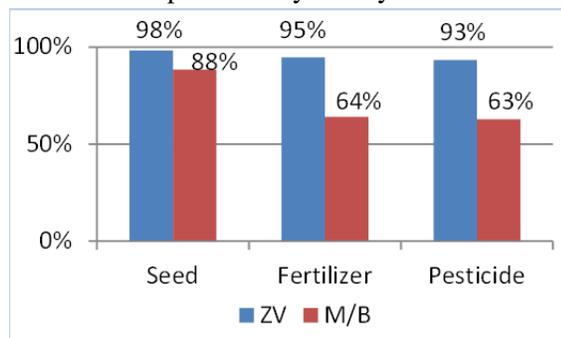
**PRODUCTION AREAS AND SAMPLE:** The horticultural production areas of the districts of Matola, Ka Mubucwane, and Ka Mavota are normally referred to as the *zonas verdes* of Maputo. Production in this area often takes place within or near the administrative boundaries of the municipality and is dominated by very small farmers (typical land holding of 0.1 ha), producing primarily green leafy vegetables under individual irrigation. The districts of Moamba and Boane, in contrast, are primarily characterized by centralized irrigation areas (*blocos*) and farmers with larger land areas producing tomato, onion, cabbage, and other horticultural crops. A less numerous group of farmers in these districts operates with individual irrigation along the rivers, outside the *blocos*. We refer to these as the dispersed producers of those districts. Land holdings

among both these types of farmers areas average 2.3 ha.

Because of the distinctly different production systems in each zone, the sample was stratified to individually represent all producers with less than 5 hectares of cultivated land with horticultural crops in each zone, with sample sizes of 344 for *zonas verdes* and 272 for Moamba and Boane. We report all results in this way. The dispersed producers of Moamba and Boane most commonly appear among the least technified farmers in those districts.

**INPUT COSTS:** Seed is the most common and the most expensive input purchased in both the *zonas verdes* and Moamba/Boane (Figure 1). This pattern holds across all quintiles of the area cultivated with horticulture in the cool season among these producers (Table 1).

Figure 1. Percent of producers purchasing seed, fertilizer and pesticide by survey location



ZV - *Zonas verdes*; M/B - Moamba/Boane

Despite seed being their greatest cost, farmers generally show low knowledge concerning what varieties of seed they use. Producers in the *zonas verdes* are able to give the common variety name for only 15% to 19% of the varieties they planted, and in Moamba and Boane, this percentage averages 11% to 22%. In

both areas, knowledge shows no relationship to the farmer's total cultivated land size.

Second to seed, the costs of pesticides are consistently greater than the costs of fertilizer across cultivated land area quintiles.

Costs for inputs across all three categories (seed, fertilizer and pesticide) generally rise with increasing cultivated area. Those in the lowest quintile of area cultivated with horticulture in the cool season in Moamba and Boane report a median value of 0 in purchases of fertilizer or pesticide in the past year (Table 1). Compared to these low rates of pesticide or fertilizer purchases among the smallest and often dispersed farmers in Moamba and Boane, producers in the *zonas verdes* generally have a higher market orientation and cultivate their land more intensively.

Among producers in the top quintile of cultivated land area in Moamba and Boane, on the other hand, the median value of fertilizer and pesticide spent on horticultural crops over the last year is 90 MZN and 3,760 MZN, respectively, and a median 11,000 MZN is spent on horticulture seed by these producers. In the *zonas verdes*, a median 930 MZN is spent on fertilizer for horticultural crops in a year among those in the highest quintile of area cultivated, 2,480 MZN is spent on pesticides, and 6,840 MZN for seed.

Compared to fertilizer or pesticides, seed tends to be bought from less formal vendors - *comerciantes ambulantes*, families, or neighbors, in contrast to state-run agri-input dealers called *casas agrárias*, privately-owned stores, or representatives sent by these stores.

Table 1: Annual median value spent (MZN) on various inputs by cultivated land area quintiles

Quintiles of Area Cultivated with Horticultural Crops in the Cool Season	Median Amount Spent (MZN) on:					
	Horticulture Seed		Fertilizer for Hort Crops		Pesticide for Hort Crops	
	ZV	M/B	ZV	M/B	ZV	M/B
Least Area - 1	697	300	260	0	400	0
2	1,950	850	390	13	760	300
3	1,800	3,814	509	30	891	1,470
4	3,250	2,850	750	45	1800	700
Greatest Area - 5	6,840	11,000	930	90	2,480	3,760

ZV - Zonas verdes; M/B - Moamba/Boane

Table 2: Index of input purchase source formality by cultivated land area quintiles

Quintiles of Area Cultivated with Horticultural Crops in the Cool Season	Mean ha cultivated in horticulture, cool season		Index of Input Purchase Source Formality					
			Horticulture Seed		Fertilizer for Hort Crops		Pesticide for Hort Crops	
	ZV	M/B	ZV	M/B	ZV	M/B	ZV	M/B
Least Area - 1	0.01	0.01	0.16	0.47	0.55	0.91	0.40	0.90
2	0.04	0.17	0.23	0.46	0.53	0.90	0.45	0.89
3	0.07	0.61	0.30	0.42	0.57	0.85	0.41	1.00
4	0.12	1.36	0.31	0.37	0.55	0.95	0.56	1.00
Greatest Area - 5	0.75	4.79	0.64	0.78	0.68	0.91	0.67	0.92

ZV - Zonas verdes; M/B - Moamba/Boane

Table 3: Annual frequency and value of pesticide purchases for horticultural crops (MZN) by principal channels

Outlet Type	Pesticide Value used on Horticultural Crops							
	Zonas Verdes				Moamba/Boane			
	Market Share	% AFs Buying	Among buyers		Market Share	% AFs Buying	Among buyers	
			Media	Mean			Median	Mean
Private store	41.3%	33.5%	788	2,419	79.5%	39.9%	975	5,577
<i>Casa agrária</i>	8.0%	10.2%	613	1,805	10.9%	14.4%	900	2,679
Informal <i>comerciante</i>	48.8%	47.7%	450	2,458	3.2%	6.8%	500	1,951
Formal <i>comerciante</i>	0.2%	1.2%	370	335	5.9%	2.3%	700	11,488
Other Family	1.6%	4.3%	330	900	0.3%	1.1%	600	803

Table 4: Annual frequency and value of inorganic fertilizer purchases for horticultural crops (MZN) by principal channels

Outlet type	Inorganic Fertilizer Value used on Horticultural Crops							
	Zonas Verdes				Moamba/Boane			
	Market Share	% AFs	Among buyers		Market Share	% AFs Buying	Among	
Media			Mean	Medi			Mean	
Private store	5.9%	15.3%	45	268	77.9%	34.4%	48	360
<i>Casa agrária</i>	1.2%	7.9%	45	95	3.1%	10.8%	15	49
Informal comerciante	89.8%	51.8%	270	1173	11.0%	11.0%	30	179
Formal comerciante ambulante	0.9%	2.0%	60	171	0.5%	2.9%	15	32
Other Family	0.5%	2.0%	473	518	3.5%	2.5%	15	343

Table 5: Annual frequency and value of organic fertilizer purchases used on horticultural crops (MZN) by principal channels

Outlet type	Organic Fertilizer Value used on Horticultural Crops							
	Zonas Verdes				Moamba/Boane			
	Market Share	% AFs Buying	Among buyers		Market Share	% AFs	Among buyers	
Median			Mean	Median			Mean	
Private store	0.3%	1.7%	45	124	4.1%	1.7%	197	165
Aviary	61.0%	52.6%	300	855	91.5%	4.0%	53	1615
<i>Casa agrária</i>	0.7%	1.5%	300	373	0.9%	0.7%	1	90
Informal comerciante	21.0%	21.7%	270	616	0.4%	0.8%	90	49
Formal comerciante ambulante	1.0%	1.2%	75	617	0.0%	0.3%	1	1
Other Family	16.0%	8.2%	180	1292	2.9%	1.4%	39	148

Table 6. Annual frequency and value of horticultural seed purchases (MZN) by principal channels

Outlet type	Seed Value							
	Zonas Verdes				Moamba/Boane			
	Market Share	% AFs buying	Among buyers		Market Share	% AFs buying	Among buyers	
Median			Mean	Median			Mean	
Private store	16.5%	24%	875	4,889	15.3%	51%	600	7,721
<i>Casa agrária</i>	46.8%	16%	400	23,191	47.2%	23%	600	59,198
Informal comerciante ambulante	28.5%	65%	350	3,095	36.7%	24%	200	61,932
Formal comerciante ambulante	0.4%	6%	200	725	0.3%	8%	250	1,411
Other Family	6.6%	32%	225	1,591	0.3%	14%	150	998
Market	0.1%	4%	100	545	0.0%	2%	100	172
Association	0.2%	2%	900	1,265	0.0%	0.5%	620	635
Agriculturalists	0.0%	0%	.	.	0.0%	1%	158	211
<i>Feira</i>	0.0%	0%	.	.	0.0%	2%	150	354
Other District	0.9%	0.3%	28,812	24,108	0.0%	0.4%	800	800
Other Channel	0.0%	0.6%	50	625	0.1%	0.0%	3,600	4,271

The preference for formal vendors generally rises with farm size in all three input categories in the *zonas verdes* but this pattern is less clear in Moamba and Boane (see table 2<sup>1</sup>). Overall, producers in the *zonas verdes* are markedly much more likely to purchase their inputs from informal channels in comparison to Moamba and Boane.

**PESTICIDE CHANNELS:** Although only 63% of producers in Moamba/Boane purchase pesticides compared to 93% of those in the *zonas verdes*, a little over a third of producers in both of these zones purchase at least one of their pesticides from a store. Private stores have a market share of 80% of sales in Moamba and Boane and a 41% share in the *zonas verdes*. Correspondingly, the greatest annual median values for pesticides are also spent in stores. After stores, 10-14% of producers across the survey purchased at least one pesticide from a *casa agrária*, however the market share of these purchases is much lower, ranging from 8% to 11% between the two zones (Table 3).

Informal *comerciantes ambulantes* differ from formal *ambulantes* in that they are not associated with a private store, but instead function as free agents who purchase and often repackage products for resale. Nearly half of producers in the *zonas verdes* purchase at least one pesticide from an informal *comerciante ambulante*. These sellers compose the largest pesticide purchase channel for this area, with a 47.7% share. The annual median amount spent for the pesticides in this channel, in contrast, is less than either in the stores or *casas agrárias*. When we look at purchases from informal *comerciantes*

*ambulantes* in Moamba and Boane, we see these economic agents are used much less in comparison to in the *zonas verdes*. (Table 3).

Regardless of what channel the pesticide is bought from, producers in Moamba and Boane consistently spend more on pesticides than producers in the *zonas verdes* (Table 3).

Among stores, AgriFocus is the most popular for pesticide purchases among producers in Moamba and Boane, with a 30% share of pesticide purchases and median of 2,600 MZN spent annually. Agrifocus is followed by Hygrotech, with a 28% share and median 700 MZN spent annually, then by PANNAR, with a 19% share and median annual value of 600 MZN. Producers in the *zonas verdes* listed Tecap more than any other store (35% market share and 900 MZN median annual purchase value), followed by AgriFocus (33% share and 1,050 MZN median value spent).

In terms of purchase location, the *sede distrital* is the most popular location for pesticide purchases in Moamba and Boane; one-third of households in this area reported buying at least one pesticide at the *sede distrital*, followed by Maputo (23%). Purchases in the *machamba* (farmers' fields) were by far the most common location for those in the *zonas verdes* (47% of producers), consistent with the popularity of purchasing from informal *comerciante ambulantes* in this area.

**FERTILIZER CHANNELS:** Among inorganic fertilizer purchases, informal *comerciantes ambulantes* compose 90% of the market share in the *zonas verdes* (Table 4). 52% of producers in this area purchase at least one inorganic fertilizer within this channel and the greatest median values spent by producers on fertilizer in this area were, correspondingly, those made in the field. The median annual value spent on inorganic fertilizer from a

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<sup>1</sup> The index of purchase location formality ranges from 0 to 1, with values closer to 0 representing purchase sources such as neighbors, friends, and informal *comerciantes ambulantes*, and values closer to 1 representing stores, *casas agrárias*, and formal *comerciante ambulantes* (store representatives operating outside the stores).

*comerciante ambulante* is 270 MZN. Following *comerciantes ambulantes* in popularity are purchases made at stores (15% of producers in the *zonas verdes*, with a 6% market share), where the median value spent is much lower, at 45 MZN/year.

Producers in Moamba and Boane generally spend less money on inorganic fertilizers compared to producers in the *zonas verdes*, with the exception of purchases made in stores. 34% of producers in Moamba or Boane purchased from a store, and only 11% purchased from *comerciantes ambulantes* or a *casa agrária*, with shares of 78%, 12% and 3% respectively (Table 4).

Organic fertilizer purchases are very common in *zonas verdes* but not at all common in Moamba and Boane (Table 5). The greatest value of organic fertilizers purchased in both the *zonas verdes* and Moamba and Boane were through aviaries. Fifty-three percent of producers in the *zonas verdes* purchased fertilizer from an aviary (with a 62% share), and 4% of producers in Moamba and Boane did so (with a 91% share). Yet informal *comerciantes ambulantes* also figure prominently in this market within the *zonas verdes*, with 22% of producers purchasing organic fertilizer from a *comerciante ambulante* for a total market share of 20.5%.

**SEED CHANNELS:** Ranked by median seed expenditures, the crops for which producers spent the most money on seed, in order, are potato, green beans, lettuce, cabbage, and cucumber. Channels of sale among crops and between zones vary greatly.

The greatest market shares of seed purchases in the *zonas verdes* were *casas agrárias* (47%), followed by informal *comerciantes ambulantes* (29%), then private stores (17%). Only 16% of producers purchased from a *casa agrária*, and 24% from a store, however, 65% of producers

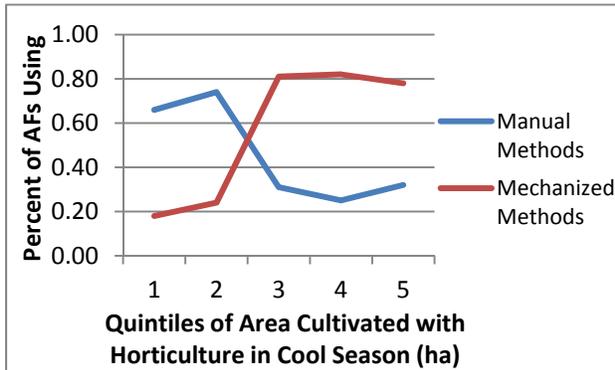
purchased from an informal *comerciante ambulante*. The greatest market shares of seed purchases in Moamba and Boane follow the same sequence: greatest in the *casas agrárias* (47%), followed by informal *comerciantes ambulantes* (37%), and then stores (15%). 23-24% of producers purchased from a *casa agrária* or informal *comerciante ambulante*, and 51% purchased from stores. In both areas, the median value of sales spent on seed were lower for purchases made from *comerciantes ambulantes* than those made in the stores or *casas agrárias* (see Table 6).

**IRRIGATION METHODS:** In addition to seed, fertilizer and pesticides, irrigation is essential for the successful harvest of most horticultural crops, and the method of its employment can make a big difference for farmers' productivity.

As has already been alluded to, 98% of producers in the *zonas verdes* of Maputo use purely manual mechanisms for irrigating their crops, that is, they water their crops by hand with a sprinkling can. Mechanized forms of irrigation (involving the use of a water pump) are practically nonexistent in these areas, reported to have been used for their horticultural plots by a total of only 0.7% of those in this group.

Whereas producers in Moamba and Boane also use manual irrigation, the use of mechanized irrigation is much more prevalent. Notably, the use of manual systems of irrigation by these producers decreases, and use of mechanical methods increases, with increasing average size of cultivated land dedicated to horticulture in the cool season (Figure 2). Fifty-eight percent of farmers in Moamba and Boane use mechanized irrigation on at least one of their horticultural fields.

**Figure 2: Irrigation systems used by quintile of cultivated land area with horticulture in the cool season (ha) in Moamba/Boane**



The most common method of mechanical irrigation is irrigation by gravity. Eighty-nine percent of those using mechanical irrigation listed this form, whereas only producers in Moamba and Boane’s top quintile of cultivated land area used irrigation systems employing sprinkler (2%) or drip (4%) irrigation methods.

**CONCLUSIONS:** Despite the large variety in input channels and expenditures by type and location, a number of conclusions can be drawn concerning irrigation use and input purchase channels:

- Farmers generally have low levels of knowledge about the varieties of seeds they use or the benefits of these compared to others, even though expenditures on seed are their largest input cost.
- Seeds are the most likely to be purchased from an informal channel as opposed to a formal channel.
- Informal input channels in general are more prevalent within the *zonas verdes* where informal *comerciantes ambulantes* are the most common source for purchases of seed, pesticide and inorganic fertilizer.
- Producers in Moamba and Boane spend more on pesticide than producers from the *zonas*

*verdes*, but not always more than these producers for fertilizer or seeds, depending on the crop and the source where they purchased.

- Larger and more technologically advanced farmers spend more on inputs and are more likely to purchase them in a formal channel rather than an informal channel.
- Water pumps are nearly non-existent in the *zonas verdes*, leading to large labor demands for regular manual irrigation.
- Among the 58% of producers in Moamba and Boane who use mechanized irrigation, very few use spray or drip irrigation methods.

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