

## O.11 - Horticulture, livelihoods and pesticides in Africa: Evidence from South-West Cameroon

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### Abstract:

This paper documents change in agro-chemical input use in horticulture using repeat surveys in 1995 and 2004 of about 300 households around Muea, Cameroon. Agro-chemical input use increased from about one agro-chemical input in 1995, to two or more agro-chemical inputs in 2004. Total expenditures for agro-chemical inputs in Muea, as well as the number of farmers using them, doubled between 1995 and 2004. The average number of agro chemical inputs used among farmers doubled between 1995 and 2004. The use of some chemicals increased from four to five times as it is the case for salt, pesticides and herbicides.

*JEL classifications: O13; Q12; Q13*

### Introduction

This paper documents how small-scale farming is intensifying in Africa around the cities, where farmers increasingly specialize within agriculture and are also involved in more non-farm activities. Special attention is given to horticulture because it is particularly important for urban diets, providing high value crops with significant opportunities for labor-using intensification on increasingly scarce land (Weinberger and Lumpkin, 2007). There is a general consensus that the horticultural sub-sector has a strong production and trading potential, limited by the lack of convenient marketing infrastructures, such as storage facilities, and rural roads (MINAGRI, 1997; Gockowski *et al.*, 2003, 2004). The data presented here are from the town of Muea on the slopes of Mount Cameroon, one of Africa's largest volcanoes rising to 4,040 meters above sea level. The town and its crop fields extend between the mid and high volcanic agro-ecozones, at an altitude between 600 and 900 meters (Almy and Besong, 1987). The town was selected as a case study for the surveys because of its prospering informal economy involving both farm and non-farm activities.

### Agriculture in the South-West Province of Cameroon

The South-West Province is characterized by the presence of a monomodal rain pattern thus creating a favorable agro-climatic environment of heavy rainfalls and rich volcanic soil. Over 85 per cent of the arable land and 79 per cent of rural workers are located below an altitude of 800 meters. About 53 per cent of the arable lands in the South-West Province are under cultivation (Almy and Besong, 1990). The South-West Province has a history of migration inflows and at the present time, productivity and innovation manage to compensate the increasing food demand from demographic pressure (Demont *et al.*, 2007). Whether or not traditional practices can meet the production levels required for the future, it is clear that there is a major shift in practices. For example, the use of fertilizers and other agro-chemical inputs is gaining in importance, especially in urban and peri-urban areas, where the marketing networks for these products are easier to implement.

### Survey methodology

In August 1995 and again in June 2004, a series of surveys were systematically conducted in Muea (Parrot *et al.*, 2008). They included a complete census of the households, a household survey, an informal finance survey and a local market survey. The censuses provided basic information and

enabled a random selection for the household survey. In 1995, 310 households were randomly selected and surveyed from a total population of 1,309 households. In 2004, 328 households were randomly selected and surveyed from a total population of 1,477 households. Prices between the two periods are deflated so that incomes and expenditures are comparable, using the consumer price index provided by the National Institute of Statistics of Cameroon over the period 1995-2004, which was 25.4 percent.

## Results

From 1995 to 2004, the total number of farmers in Muea increased by about 20 per cent. The number of farmers involved in horticulture remained relatively stable but their income increased. Total annual incomes of Muea increased by 14 per cent between 1995 and 2004, from 2.86 million Euros to 3.27 million Euros. Incomes per capita for the labor force remained stable at around 1.600 Euros. Incomes per capita for adult equivalent income increased by 34 per cent to 840 Euros in 2004. This improvement of income can be explained by the reduced size of households. It also should be noted that Cameroon faced a strong economic crisis which started in the late eighties and resulted in the devaluation of the CFA franc in 1994. This could explain at least partially this improvement since real wages were at their lowest rate in 1995.

About half of the total population of Muea owns cropland. Even if we consider non horticultural farmers and non-farmers among the rest of the population, the situation improved significantly between 1995 and 2004 in terms of land ownership for horticultural farmers (from 54 to 66 per cent), non horticultural farmers (from 49 to 59 per cent) and even for non-farmers (from 25 to 28 per cent) who own land to a lesser extent (about a quarter of their households), mainly for self-consumption purposes. However, it is more difficult to analyze precisely change in land allocation for staple crops and horticulture, including tree crops such as coffee and cocoa since sharecropping is widely practiced. The use of paid labor increased from less than one per cent to 29 per cent among households. Paid labor was almost inexistent in 1995, but in 2004, about 60 per cent of horticultural farmers used paid labor, as compared to only 15 per cent for non-horticultural farmers.

**Table 1: Annual income per farmer involved in horticulture in Muea by crop, 1995 and 2004 (Euros at 1995 prices).**

	1995 (N=221)		2004 (N=197)		
	Mean	Std. Error	Mean	Std. Error	Variation
Leafy vegetables***	7.6	1.5	36.8	7.4	383%
Maize***	10.6	1.3	50.2	8.2	373%
Avocado	2.6	0.7	10.5	3.3	298%
Banana	9.2	2.0	33.7	12.3	267%
Safou (prunes)*	4.1	1.8	14.7	4.1	257%
Pepper	0.6	0.2	1.9	0.6	230%
Tomato	2.3	0.8	5.4	2.3	136%
Cassava leaves	14.0	1.7	15.3	2.4	9%
Orange	10.7	8.4	8.4	3.1	-21%
Okra	3.6	0.9	2.8	0.7	-22%
Papaya solo	n.a.	n.a.	6.8	3.7	-
Watermelon	n.a.	n.a.	0.9	0.5	-
Incomes from horticultural crops***	69.9	9.8	194.0	22.1	178%

Note – Papaya and water melon were not yet introduced in Muea at the time of the survey in 1995.

n.a. = not available.

\*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$

Table 1 lists all the horticultural crops produced in Muea in declining order of average income variation between 1995 and 2004. The results are displayed according to the total population of farmers. Leafy vegetables were already a large and diverse group of crops in 1995, but trade increased their importance considerably. Plantain, considered as a staple crop, was not included in the list of horticultural crops. Results show that all average incomes per farmer derived from horticultural crops increased during the period and only significantly for leafy vegetables, maize and safou. Only income from oranges and okra declined but not significantly. The increase of income from horticultural crops can be explained by the rise of urban demand (higher quantities and/or higher prices).

Horticulture requires not only land but also more agro-chemical inputs than staple crops. In 1987 in the South-West Province, although half of the farmer population used the acidifying ammonium sulphate and half 20-10-10, only 3 per cent of farmers have ever used a pesticide or a fungicide (Almy and Besong, 1987). At this time, and despite the presence of extension services in the Province, only 14 per cent of farmers had been visited more than yearly (Almy and Besong, 1990).

In 2004, agro-chemical input use increased strongly for horticulture as horticulture is often associated with cash crops. Agro-chemical input use increased from about one agro-chemical input in 1995, to two or more agro-chemical inputs in 2004. Total expenditures for agro-chemical inputs in Muea, as well as the number of farmers using them, doubled between 1995 and 2004.

**Table 2: Chemical use among farmers in Muea between 1995 and 2004**

Nomenclature	1995 (N=305)		2004 (N=269)	
	Frequency	% valid observations	Frequency	% valid observations
Salt***	17	6%	159	59%
Pesticide***	27	9%	127	47%
Fertilizer 20-10-10	102	33%	96	36%
Fungicide	52	17%	54	20%
Herbicide***	37	12%	112	42%
Regular use of chemical types***	136	45%	211	78%
Average number of chemical types used***	0.50	(0.06)	1.02	(0.06)

\*P<0.05; \*\* P<0.01; \*\*\* P<0.001.

The average number of agro chemical inputs used among farmers (Table 2) doubled between 1995 and 2004. In the town of Muea, the use of some chemicals increased from four to five times as it is the case for salt, pesticides and herbicides. Fertilizers and fungicides did not significantly increase during the period but they still remain in large use.

## Conclusion

The major challenge faced by agriculture in Africa is the non sustainability of its present trends in the intensification process required to meet the demand for food (Reardon *et al.*, 1999). 67 per cent of horticultural farmers in Muea believe production is increasing as compared to 15 per cent among non-horticultural farmers; but, about half of the horticultural farmers use more fertilizers than before, against 10 per cent among non-horticultural farmers. Under these conditions, there is no doubt that the use of agro-chemical inputs will influence environmental issues such as reduced fallow time, multiple cropping cycles, as well as human health (Keys *et al.*, 2005). In-depth research is needed at this level to check if agro-chemical input use is sustainable in urban and peri-urban small scale farming. Stronger monitoring and control are necessary for agro-chemical input use in a context of prevalence of the informal sector.

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