

# Pesticides in export and domestic agriculture: Reconsidering market orientation and pesticide use in Costa Rica

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## Abstract

The environmental impact of agro-export production in developing countries remains an important research topic. The political economy-inspired literature on developing country agro-exports maintains that export crops are pesticide intensive – or, more generally, environmentally destructive – while local and national market crops are less pesticide intensive, or environmentally benign. If used to draw conclusions about the impact of national market versus export market expansion, this view has significant limitations, most importantly the comparison of high-commodity value export crops with low-commodity value crops for national market. To overcome this and other limitations of prior analyses, this paper addresses the question: how does market orientation influence pesticide intensity where the same crops are grown for both the national market and for export? Data from a survey of Costa Rican vegetable farmers are used to compare pesticide intensity of 27 vegetable crops, five of which are produced for both national and export markets. The general pattern that emerges is that national market vegetables are more pesticide intensive than export vegetables in the area. Yet, controlling more for the crop variable is important, and specific comparisons of the five vegetables grown for both markets – carrot, chayote, corn, green beans, and squash – illustrate that market orientation alone does not determine pesticide intensity, but that it is jointly influenced by regulatory risk, crop value, and pest susceptibility, among other factors. Continued attention to both political economy and ecological processes in “second nature” will allow political ecology to make important contributions to understanding pesticide problems and implementing agroecological solutions.

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## 1. Introduction

The environmental impact of the globalization of food has become an extremely important research topic in many disciplines and subfields, including geography and political ecology. High-value foods exports – a category that includes fresh fruits and vegetables, meats, dairy products, and shellfish – have increasingly unseated the Global South’s traditional and more durable export commodities of coffee, cacao, sugar, and tea (Watts and Goodman, 1997). As of 1989, high-value foods made up 5% of global

trade, the same percentage as crude petroleum (Jaffee, 1993, p. 1). Important debates continue concerning developing countries’ dependence on agricultural exports and their impacts on development, equity, and the environment (Grossman, 1998; Maxwell and Fernando, 1989). In the export-crop debate, proponents expound upon the macro-economic benefits of increased foreign exchange earnings and agro-exports’ potential to alleviate poverty through employment or the participation of small farmers who are at a comparative advantage due to the labor-intensive nature of many of the crops (cf. USAID, 1994). Critics argue that the strategy does not meet the food security needs of the population, increases inequality due to socio-economic scale biases of the crop-technology package, and

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is not sustainable due to its reliance on heavy agrichemical inputs which cause environmental degradation and serious human health problems (cf. Lappé et al., 1999).

While sympathetic to critiques of agro-export dependence, here I argue that by exclusively focusing on export crops and neglecting to focus critical attention on the environmental impacts of national markets, the critical literature on the environmental effects of agro-exports makes empirically-questionable assumptions about pesticide use on crops bound for different markets.<sup>1</sup> Specifically, the literature concludes that export crops are pesticide intensive<sup>2</sup> – or, more generally, environmentally destructive – while local and national market crops are less pesticide intensive or environmentally benign (Barry, 1987; Thrupp, 1990, 1991, 1996; Thrupp et al., 1995; Weir and Schapiro, 1981). While generally correct when pesticide intensity data are aggregated at a national level, these prior analyses face three important limitations in drawing conclusions about the local environmental effects of export versus domestic production. First, they compare very different crop types. Second, they assume that staple crops accurately represent domestic agricultural production. Third, they do not pay enough attention to the local social relations of exchange.

This paper seeks to overcome these limitations by addressing the following question: how does market orientation influence pesticide intensity where the same or very similar crops are grown for both the national market and for export? To answer this question I explore together the effects of three important factors that vary by market orientation – regulatory risk,<sup>3</sup> crop value, and pest susceptibilities – on the intensity of pesticide use on vegetable crops. Research methods involved fieldwork in the vegetable producing area of Northern Cartago and the Ujarrás Valley, Costa Rica (Fig. 1), where farmers produce more than 30 crops for the domestic and export market. The research combines an understanding of political economy in the area – especially the social relations of exchange in contract farming (cf. Clapp, 1994; Watts, 1992) – with the use of a crop-specific perspective from human–environment geography (Sauer, 1969; Zimmerer, 1996).

The paper is organized as follows. I first review the critical literature on Latin American agro-exports to demonstrate the common view of market orientation and pesticide use. I then provide a brief conceptual revision of conventional wisdom to allow for better comparisons. Methods are then discussed, with most attention given to the farmer survey from which crop-specific pesticide intensity data were obtained. Results show that pesticide use on

national market vegetable crops is generally higher than on exported vegetables in the study site, a situation I refer to as the “pesticide paradox”. Yet, looking beyond this general finding reveals considerable variability of pesticide intensity *within* market segments, leading me to problematize the binary thinking about pesticide use and market scale in developing countries. By examining specific crop comparisons, I suggest that regulatory risk, crop value, and pest susceptibility all jointly influence pesticide intensity, thereby making it inaccurate to draw conclusions about pesticide intensity based solely on market orientation. In the conclusion I discuss nuanced considerations about the environmental effects of markets, explore the geographical variability of the conventional wisdom on pesticide use and markets, and highlight the continued need for political ecologists to pay attention to material processes in “second nature,” defined by Biersack (2006) as nature that is humanly produced and that is part of, but not entirely within, the human realm.

## 2. Background: pesticides and markets in the critical agro-export literature

Research from a political economy perspective typically argues that export-crop production in developing countries is very pesticide intensive relative to national market production. In their seminal work, *Circle of Poison*, Weir and Schapiro (1981, p. 32) make the argument explicitly:

over half, and in some countries up to 70%, of the pesticides used in underdeveloped countries are applied to crops destined for export to consumers in Europe, Japan, and the United States. The poor and hungry may labor in the fields, exposed daily to pesticide poisoning, but they do not get to eat the crops protected by pesticides.

They use many examples, including Indonesian plantations growing rubber, coffee, sugar cane, and coconuts, which consume 20 times more pesticides than small farmers producing food for local markets (Weir and Schapiro, 1981, p. 33). Similarly, Barry (1987, p. 97) states that since the 1950s, “pesticides have become an integral part of cash-crop production in Central America”. This could mean cash crops for national consumption, but Barry (1987, p. 104) is referring to only cotton, coffee, and banana exports since he goes on to state, “of the 11 pounds of pesticides used per capita in the region annually, only a few drops are applied on food crops for local consumption”. Thrupp’s political ecological work in Central America provides another example. She writes, “[t]he largest amounts and most intensive use of pesticides are in large export-crop plantations of cotton, bananas, coffee, and sugarcane, which form the main basis of these small economies” (Thrupp, 1988, p. 41). More recently, Jorgenson (2007, p. 75) states, “[a]s farming systems in less-developed countries are integrated into the international economy, often through the influence and control of foreign capital, crop

<sup>1</sup> Here I am referring to conventionally produced agro-exports, not to the growing certified market segments like organic or fair trade.

<sup>2</sup> I use the term “pesticide intensity” to refer to the quantity of pesticide used per unit land, as in both the academic (Decanio and Norman, 2005) and activist literature (Kegley et al., 2000).

<sup>3</sup> Regulatory risk refers to the risk of economic and market access loss created by enforcement of pesticide residue regulations in industrialized nations (Galt, 2007).

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