Floriculture and the Health Divide
A Struggle for Fair and Ecological Flowers

Jaime Breilh y otros

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LATIN AMERICAN HEALTH WATCH

Alternative Latin American Health Report

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LATIN AMERICAN HEALTH WATCH

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PEOPLE'S HEALTH ASSEMBLY 2

GLOBAL HEALTH WATCH
THE PEOPLE'S MOVEMENT

INTERNATIONAL PEOPLE´S HEALTH COUNCIL

RESEARCH MATTERS

SCHOOL OF MEDICINE – U. OF CUENCA
NACIONAL PEOPLE'S HEALTH FRONT

CENTER FOR HEALTH RESEARCH AND ADVISORY
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ECUADOR, JULY 2005

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Alternative Latin American Health Report

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The Watch is a broad collaboration of public health experts, non-governmental organizations, civil society activists, community groups, health workers and academics. It was initiated by the People's Health Movement, Global Equity Gauge Alliance and Medact.

This alternative world health report is an evidence-based assessment of the political economy of health and health care – and is aimed at challenging the major institutions that influence health.

The Watch is available for free download at the website **www.ghwatch.org**, and on CD, available by contacting **ghw@medact.org.** It will be published by Zed Books in December 2005.

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LATIN AMERICAN HEALTH WATCH

Alternative Latin American Health Report

Jaime Breilh
CEAS (Editor)

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7 Floriculture and the Health Divide*: A Struggle for Fair and Ecological Flowers

Jaime Breilh, Arturo Campaña, Francisco Hidalgo, Doris Sánchez, Ma. Lourdes Larrea, Orlando Felicita, Edith Valle, Juliette Mac Aleese, Jansi Lopez, Alexis Handal, Alex Zapatta, Paola Maldonado, Jorgelina Ferrero and Stella Morel**

Floriculture and the Contradictions of "New Rurality"

The outburst of economic fundamentalism since the 80s has accelerated capital accumulation and social regression in Latin America. Policies were changed to benefit big corporations. Social protection norms were dismantled and labor rights were abolished. The so-called "Keynesian" or protector State was dismantled and inequity flourished in most countries.

The impact on rural societies was profound. A "new rurality" appeared [Giaracca, 2001]: ancestral and classical plantation ("hacienda") agriculture and indigenous community cultural forms evolved into a scenario of aggressive agribusiness productivity, based on "green revolution" technical systems. The logic of competitiveness and mono-cultural agriculture exportation penetrated the fields of Latin America, displacing community agrarian relations and agro-ecological cultures.

Great pressure has been imposed on small peasant economies, which have affected rural relations and socio-cultural patterns. Indigenous organizations and rural communities that attempt to stop the concentration of land, water, financial resources, and above all, the subordination of people to foreign and non-solidarity modes of life have counteracted this imposition.

Cut flower production in countries like Colombia, Costa Rica, Ecuador and Mexico, illustrates neoliberal mechanisms that have been imposed in ru-

* Preliminary paper based on first stage research analysis; CEAS EcoHealth Program supported by IDRC/ Canada

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ral development and is an interesting subject of debate that can be approached from opposing perspectives about social and human development. Some would argue in favor of agribusiness as the panacea of modernization and progress (higher productivity; employment source; complementary business activation and modernization of rural life). To many others, entrepreneurial monopoly floriculture is a false solution that conceals, under apparent affluence and highly rentable private business, serious social and ecological problems. Job supply and slight income raises do not imply a real redistribution process that can encounter the accelerated income concentration rate, the ever widening social gap, and above all, the loss of human rights and cultural identity.

The impact of floriculture surpasses the economic terrain and affects communities, social organizations and the fundamentals of life in small cities of the region. High tech floriculture farms do not solve socioeconomic problems, but rather take advantage of cheap community labor and low income due to the ineffectiveness of the agrarian reform process and the eagerness of traditional "haciendas" to become prosperous modern cut-flower farms and holdings.

CEAS´ EcoHealth Program operates in the Granobles River Basin (North Andean Region of Ecuador), characteristically a modern floricultural area, where high productivity in relatively small areas has put pressure on the land market, forcing many impoverished peasants to sell their properties. This has favored a process of land concentration, attracting labor from nearby communities –and even other regions- and created and an ever-growing dependency of young workers. Nevertheless the transformation of peasants to workers operates through drastic mechanisms of cultural changes that annul the values of solidarity, of care of the "mother land" and of ancestors that make up their original identity.

The absence of agrarian development policies and social support especially drives younger peasants towards floricultural work and impedes the building of sustainable community economical activities that could prosper in the area. Land ownership concentration, and corresponding access to irrigation water and to financial support close all other local alternatives and stimulate either emigration or the search for agribusiness employment.

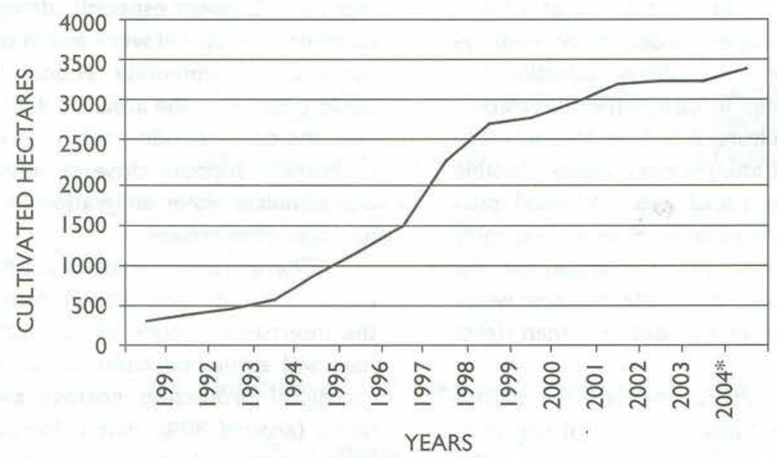
There are two kinds of cut-flower farms (mainly export cut rose production): those that comply with the international code of conduct and FLP Program (fair and ecological labor, social security, health and ecological protection norms); and the majority of farms (around 80%) that unfortunately operate without any control and increase their capital accumulation and profit by avoiding responsibilities to their working force and environment.

Floriculture has grown dynamically in the last 15 years (refer to Figure 1). It is globalized not only since it depends on the ups and downs of the world market, or as it arises from the logic of external investment, but primarily since essential decisions are made beyond the region. This decision-making process is vastly subject to global technologies: computer science, for real time electronic interchange of data, chemical research and genetic research. It is neither in Cayambe nor Tabacundo where issues, such as the following are decided: what will be produced; with whom to become associated; with whom to sell; or from whom to purchase resources.

Floriculture production circuit[1] has a previous stage in the patentees or "obtentores" (Holland, United States); afterwards flowers are produced in Ecua-

1. According to Santos (2001), analysis centered on work territorial division proffers only a relatively static view. An approach that takes into consideration spatial production circuits defined by the circulation of goods and products, offers a dynamic perspective of the manner by which fluxes go across territory.

ECUADOR. EXPORT CUT FLOWER PRODUCTION AREA HECTARES



Fuente: Expoflores. Elab.: M. Lourdes Larrea (CEAS)

dorian inter-Andean valleys, mainly on the basis of external resources, however, employing a national workforce; subsequently postproduction and packing are performed within the same farm, and finally flowers are sent to international markets by airfreight, especially the United States, followed by Europe. Technologies and logics of multinational agrochemicals, as well as those of variety producers determine the rhythm and characteristics of productive processes and finances of companies. Flower prototypes are produced by companies specialized in genetic research to launch a greater number of and more sophisticated varieties in the highly competitive and capricious international market[2]. Though floriculture receiver zones, such as the Granobles River Basin, achieve urban and agricultural modernization, they lose control of local production [Larrea & Maldonado, 2005].

Floriculture does not stem from the development of traditional agriculture, as would milk products, intensive agriculture, or fruit industrialization, since, in its implantation; characteristics of pre-existent production are not so significant. The determinants of its installation correspond to factors, such as quantity of light per day and during the year; access to land with relatively easy credit; availability of abundant and inexpensive workforce; presence of plentiful water in the land; access to communication services (electric power, telephone, internet, cable, etc.), and to a large extent, the proximity to markets by high-

2. The operational resources almost totally imported correspond to 50% of the required. In addition, payment of royalties for the acquisition of bulbs and cuttings, and maintenance of plants reaches, consistent with several experts, 85% of culture costs (Alvarado 2002).

ways and airports. This indicates that floriculture is extremely dependent on public networks of modern infrastructure.

The installed production capacity is distributed in various managerial groups, from family groups to international holdings, and multinational branches, which tend toward vertical integration. A sign of capitalist development is the high profitability of a majority of farms (300 farms of 10-15 has on average), with important investment, use of resources and workforce. Medium or large companies have their own topology spread within the territory: farms in diverse regions; administrative offices, and commercializing agencies in Quito or Cuenca; their own truck fleets, and even cold-storage installations at the airport. It has not accomplished the resolution -neither individually nor as a union– of the critical knot of airfreight transportation to destination markets. The latter constitutes one of the higher expenditure items in the net price[3] [Alvarado, 2002]. Additionally, it has not succeeded in productive research and intellectual property policies to confront elevated payment to patentees. The high cost of money that resulted from the "dollarization" of local currency is also evident [Alvear, 2000].

Moreover, the floriculture spatial circuit in its marked dynamism requires numerous and varied resources and related services (packing, industrial protection equipment, textile and shoemaking industry, graphic and paper industry, nourishing services, computer production and knowledge (hardware and software), personnel specialized in constructing and repairing greenhouses and diverse machinery). The location of farms decisively influences demographic growth.

The axis of location of farms within the national territory, and thus the main axis of fluxes, follows the route of major roads (Panamerican Highway and other first-rate ones) concentrated in the inter-Andean valleys, from 2600 to 2900 meters above sea level, in 8 provinces, as illustrated in the map.

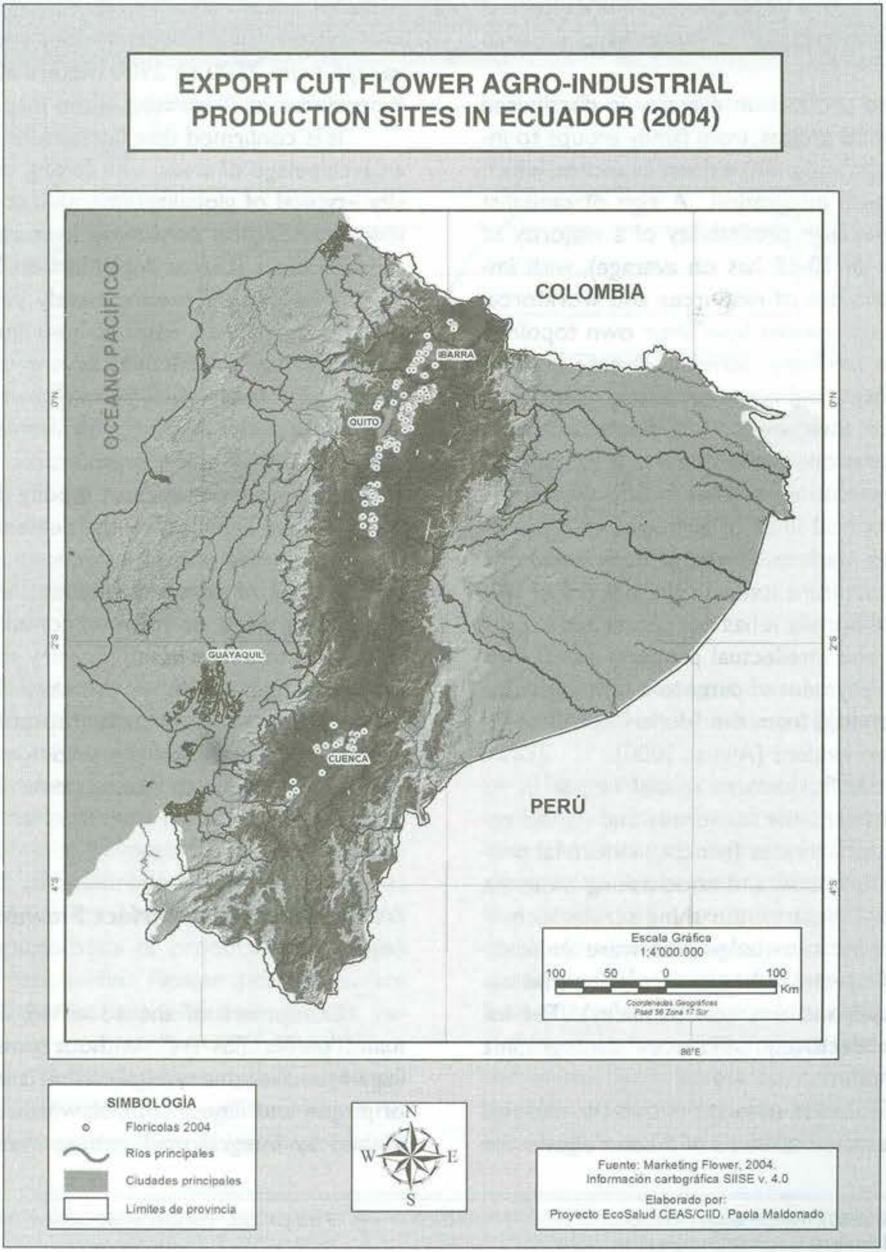
It is confirmed that floriculture presents itself as an archipelago of areas with strong technological density –typical of globalization-, against a background of low technological density, agricultural and traditional peasant zones [Larrea & Maldonado, 2005].

Workers are predominantly young, with vitality and the capacity to adapt to overtime demands, performance, high productivity, severe rhythm; with basic educational levels that permit their training in the farm; and a minor degree of involvement in peasant-indigenous and/or union organization. To assume working living modes, they must modify their cultural patterns. Albeit, their leaving the peasant community circle, or even the one of indigenous culture, implies a certain level of personal freedom and relative autonomy of a wage or income, conversely it supposes subjection to a new bond of a very strenuous proletarian working pattern. In the case of working young women, it entails a particular rupture with respect to patriarchal relations of the traditional community to fall into submission to intense demands of productivity of companies.

Water And Soils: Perfect Flowers And Threatened Life

Consumers of the so called "First World" demand "perfect flowers" –without spots on petals or foliage. However, this symbolic value is attained by means of plague and illness control, which could be accomplished by integral management systems, without or

3. According to Alvarado (2002), transportation corresponds to 19% to 37% of the final price of the product. The cost of management and sales (brokers, wholesalers, customers and retailers) in destination represents roughly 32%.


EXPORT CUT FLOWER AGRO-INDUSTRIAL
PRODUCTION SITES IN ECUADOR (2004)
COLOMBIA
OCÉANO PACÍFICO
IBARRA
QUITO
GUAYAQUIL
CUENCA
PERÚ
Escala Gráfica
1:4'000.000
100
50
0
100
Km
SIMBOLOGÍA
Floricolas 2004
Ríos principales
Ciudades principales
Límites de provincia
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Fuente: Marketing Flower, 2004.
Información cartográfica SIISE v. 4.0
Elaborado por:
Proyecto EcoSalud CEAS/CIID, Paola Maldonado

with a substantial reduction of chemical use. Unfortunately, the majority of companies (which do not participate in the FLP program) resort to irresponsible use of pesticides and other dangerous agro-toxics, due to their profit logic. Also, the advertising of agrochemical companies promotes the massive use of chemical products and subjects them to the culture of the green revolution. Thus, the majority of flower companies, which do not work properly, contribute to contamination in valleys. Small highland farmers, forced by their economic and technical needs, also have recourse to chemical control of their agriculture, especially potatoes and pastures. In numerous occasions the situation is aggravated due to low-priced and highly dangerous chemicals –red and yellow label- (refer to Table N°1).

CEAS designed a sampling system[4] to differentiate these impacts, obtaining results whose preliminary analysis show perturbing conclusions [Sánchez & Mac Aleese, 2005].

Impact on Hydric Systems

Systems connected to La Chimba and Pesillo zones (potatoes and cattle producers) and San Pablito de Agualongo and Cananvalle (floriculture effluents collection zone) were studied. Water of the corresponding hydric systems and sediments of the matching river basins are contaminated with chemical residuals in a proportion relative to their proximity to contaminating sources: lesser in higher sectors of fountains, moderate in potato, pasture and barley production zones, and greater in the floriculture agro-industrial valley (refer to Table N°2).

TABLE N° 1 CHEMICALS USED IN FLORICULTURE AND OTHER CROPS

PRODUCT	CHEMICAL GROUP	USE	TOXICITY LABEL
Fosetil aluminio	Phosphate	Flowers-potatoes	Blue
Hidrocloruro de propamocarb	Carbamate	Flowers *	Green
Mancozeb	Acetamide	Flowers-potatoes	Yellow
Methiocarb	Carbamate	Flowers *	Yellow
Metomil	Carbamate	Flowers *	Red
Carbofuran	Carbamate	Flowers-potatoes	Red
Diazimon	Organophosphates	Flowers *	Yellow
Demeton – S – metil	Organophosphates	Potatoes *	Red
Malathion	Organofosforado	Potatoes & other *	Blue
Metamidefos	Organophosphates	Flowers-potatoes	Red
Tiociclamhidrogenoxalato	Nerehistoxina	Flowers *	Yellow
Bromuro de metilo	Methyl bromid	Flowers *	Red

4. Sampling points to study residuals in water through liquid and gas chromatography; they are explained in Table N02.

Research on highly persistent agrochemical hydro-soluble residuals in the basin reveals important results. Contamination by persistent hydro-soluble residuals reappears mostly in periods of lesser flow or dilution (July-August) and of greater production and agricultural use of chemicals (November-December). Observing Table N°2, we verify a high concentration of residuals in the effluents of the flower farm (T1), or in the branches of the hydric system of the valley (P2 and P3) during December – the month in which there is an intense production for Saint Valentine's Day-. Dissemination of contaminants is thus produced by farms lacking controls (which are not a part of the FLP program), as a consequence of their high productivity logic. There is no doubt that small potato and pasture producers pollute as well, by allowing non-filtered superficial residuals to seep into the soil (CHi and CH2) (Table N°2). In addition to the presence of detectable residuals in water, there is the incidence of heavy metals (chrome, manganese, and zinc) that are residual components in levels correlative to the use of pesticides. Furthermore, the general deterioration of water quality results from the presence of nitrogen, sulfur, and phosphorus derived from fertilizers and pesticides in high grades detached from agrochemicals. In other words, water from floriculture basin hydric systems denotes a critical effect in its physicochemical and biological properties. Also, we begin to confirm the consequences that the presence of toxic elements and residuals have on human health.

With the aim of strengthening the community's capacity of early detection of water chemical contamination and its impact on living organisms, CEAS undertook an experimental program to perfect bioassays originally conceived of by an international team under the auspices of the CIID (Canada)[5]. The first results show the expected gradient in growth inhibition of onion roots (Allium cepa L.) within high zones (potatoes and pastures with only 16% to 21% of inhibition) and the flower zones samples (with 46% to 72% of inhibition) [Felicita, 2005].

Evidence of contamination by lipo-soluble chemicals in bovine milk (bio-accumulation) were also found; hence, the troubling corroboration of highly dangerous chlorinated chemical residuals, such as ppDDT in distinct sampling points during December are an alarming and deserves continuous study by the CEAS.

Albeit, floriculture is not the only source of contamination, collected evidence demonstrates it is of major importance. Moreover, contamination by dangerous residuals in water is not the only mode of impact on the ecosystem, since our study establishes that the productive system employed in flowers contaminates soils. The accumulation of residuals in sediments is effectively superior to that of water in the majority of cases (Table N°2). In farm soils, the accumulation of residuals in soils (studied by phase extraction –"solid phase extraction" SPE- and analyzed by gas chromatography) is greater as the time of productive use of soils passes (refer to Figure N°3) [Aguirre, 2004].

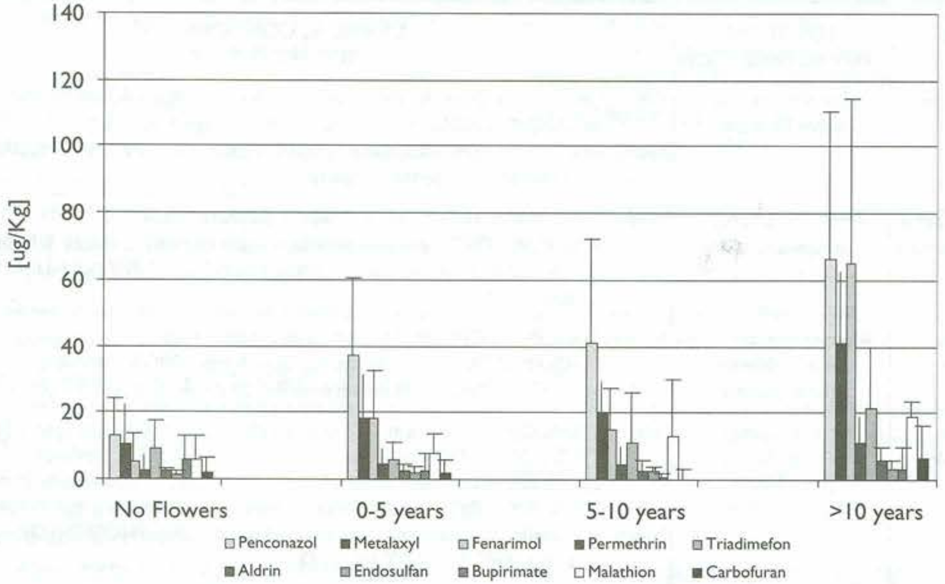
The mentioned process triggers soil degradation, causing loss of biodiversity, with grave alteration of its composition, diminution of metabolic rate, destabilization and sterilization; a prolonged effect not counterbalanced by the artificial elevation of the organic composition, a conventional indicator [Aguirre, 2004].

5. The Research Center for Development (CIID) of Canada sponsored an international study to implement easy-operation bioessays to measure the impact of water chemical contamination on the four biotic systems (i.e. onion/lettuce, water fleas, and algae). They are systematized in Dutka, BJ (1996) Bioessays: A Historical Summary of Those Used and Developed in our Laboratories at NWRI. National Water Research Institute, Environment Canada, Burlington.

TABLE N° 2 STUDY ZONES : DIFFERENTIAL CONTAMINATION IN THE FLOWER PRODUCTION REGION			
ZONE COD	NAME	LOCATION CHARACTERIZATION	CHEMICAL CONTAMINANTS & IMPACTS (*) (**)
CH1	Chahuancorral Alto	High altitude, near water fountains	Water:ORG. PHOS/CHLOR : Betaendosulfan & Endosulfan sulphate (trace) PHYS/CHEM/BIOL: pH low; sulphur; nitrite; high bacter & high DBO5. Sediment: CARB:3 Hidroxicarbofurán (trace, August); ORG.PHOSP/CHLOR: Betaendosulfán (trace , August)
CH2	Chahuancorral Bajo	After potato crops, pasture and other	Water: ORG. PHOSPH/CHLOR : Endosulfan Sulphate (trace, Feb) PHYS/CHEM/BIOL: pH low; sulphur, nitrites, nitratos; c. bacter & highDBO5 Sediment: CARB:3 Hidroxicarbofurán (trace, August); ORG.PHOS/CHLOR: Betaendosulfán (trace, Feb)
AY1	Ayora Puluví	After community and before flowers (Low North)	Water: ORG. PHOS/CHLOR :Betaendosulfán (trazas Feb) FIS/QUIM/BIOL: nitrite, nitrito, con bact & high DBO5 , hardness Sediment: ORG.PHOS/CHLOR:Betaendosulfán (trace, Augst); ppDDT (trace, Diciembre)
AY2	Ayora Granobles	After community and before flowers (Low North)	Water: CARB: Carbofurán (high Dec. 0.08 y Feb 7.1); Metomil (high Dec 1.53 y 18.2 Feb) ORG. FOSF/CLOR: Cadusafos (August 7.59 y Feb 0.66); Dimetoato (trace, Feb); Clorpirifos (trace, Feb); Betaendosulfan (0.28 Dec y Tiabendazole (trace, August) PHYS/CHEM/BIOL: sulphate, nitrito, nitrate, hardness, very high bacter y& DBO5 Sediment: CARB:3 Hidroxicarbofurán (trace, August); ORG.PHOS/CHLOR: Cadusafos (trace, Feb) & ppDDT (trace, Dic)
P1	Pisque Pool area	Center, after river confluence Guachalá River & Granobles River; oxygenated river tract	Water: PHYS/CHEM/BIOL: nitritos, nitrate, hardness, high bacter & DBO5 Sediment: ORG.PHOSP/CHLOR: ppDDT (trace, Dec)
P2	Pisque "Gorge"	Gorge, farm water discharge point (7 km from P1, South Cayambe)	Water: ORG. PHOSP/CHLOR :Betaendosulfan & Endosulfan sulphate (trace, Dec) PHYS/CHEM/BIOL: nitritos, nitrate, hardness, high bacter & DBO5 Sediment:ORG.PHOSP/CHLOR: Betaendosulfán (trace, August)
P3	Pisque "Bridge"	Basin exit point	Water: CARB:Carbofurán (1.5 August); ORG. FOSF/CLOR : Betaendosulfan (trace, en Dec) PHYS/CHEM/BIOL: sulphate, nitritos, nitrate, hardness, very high bacter & DBO5 Sediment: ORG.PHOS/CHLOR: Betaendosulfan (trace, en August)
T1	Flower Farm T	Farm effluent (Cananvalle)	Water: CARB: Carbofurán (23.1 in Dec);Metomil (3.8 Dec & 1.2 Feb). Oxamil (4 in Feb): ORG. PHOS/CHLOR : Diazinon (trace, Feb); Clorotalonil 0.99 in Dec); Alfaendosulfán (0.09 in Dec); Betaendosulfan (0.35 in Dec); & Endosulfan Sulphate (trace, Dec). PHYS/CHEM/BIOL:very high DQO; low sol O , sulfphate, sulphur, high nitritos & nitrate , chloride, hardness, high bact & DBO5 Sediment: ORG.PHOS/CHLOR: Dimetoato (trace, Feb); Alfaendosulkfán (0.09 in Dec); Betaendosulfán (78.76 in Dec); & Endosulfán sulphate (trace, Feb)

(*) CARB= Carbamates; ORG.PHOS/CHLOR:= Organophosphates & organ chlorinated; PHYS/CHEM= physical chemical parameters
(**) Types and names of observed chemical residuals are stated, Either traces or bigger concentrations, either in water or sediment: water (Ig/L) or sediment Ig/kg.)
Source: EcoHealth (CEAS), 2004; Ecuadorian Atomic Energy Commission Laboratory

FIGURE N° 3 SOIL CHEMICAL CONTAMINANTS BY FARM TYPES CONCENTRATIONS - μG KG -1



Source: Aguirre (2004)

A further serious consequence in the ecosystem is the problem of water demand. To have an idea of the magnitude of this, we just have to contrast water consumption by small farmers of the zone (only 1.000 liters / month / ha in peasant production), or that of traditional "haciendas" (17.000 to 20.000 liters/ month / ha in agriculture and livestock production), with the enormous water demand by flower farms (900.000 to 1.000.000 liters / month / ha in monthly flower production) [Sánchez & Mac Aleese, 2005].

In sum, our study offers evidence of severe impact of the current floriculture system, and requires reflection upon whether this type of productive system is sustainable, or if it should be continued, that it do so without gravely compromising future ecosystems.

Health Impacts on Workers ("ex-peasants"): Selling Life at a High Cost

The logic that organizes entrepreneurial floriculture provokes serious changes in the life patterns of communities and agricultural workers. A contradiction exists in their modes of living because, on the one hand, it generates employment and monthly income slightly above the average rural wages, while on the other hand, unfortunately, imposes hazardous daily activities and exposure to dangerous chemical substances.

Our study reveals that, on average, 31% of families of the study area[6] have at least one economically important member working in floriculture. In those communities with weaker ties to this activity, as many

6. Communities that made part of our sample were: "La Chimba", "Pesillo", "Agualongo" y "Cananvalle", totaling 388 families.

as 24% family heads work in flower farms and up to 52% in those villages with closer links [Handal, 2005]. In the Cananvalle Community, as many as 67% family heads work in cut flower production. [Ferrero & Morel, 2005]. Therefore, a significant proportion of villagers live under conditions directly or indirectly defined by the floricultural system.

The flower production process obeys the logic of capital accumulation: maximum profitability and surplus value extraction. It depends on highly demanding, chained, routinary and stressful work, with insufficient brake periods (especially during high flower demand cycles like Saint Valentine's Day or throughout the months of November to January), as well as chronic exposure to chemical, physical and ergonomic hazards. Intensive pesticide use is characteristic of non-ecological flower production and in communities with a high proportion of flower workers, 60% to 75% of pregnant women used pesticides. In communities with fewer ties to floricultural work, only 17% of pregnancies were exposed to pesticides; also in the first group, 40% of children were in contact with contaminated working clothes, contrary to a lower 18% in those communities with weaker floricultural ties [Handal, 2005].

Working conditions vary among different farm areas based on the following: the type of labor, schedules, and type of tools and equipment used. Those working modes vary among sections and also determine workers' quotidian forms of practice. Overall, cut flower production rhythm is intense and permits little control on the part of the worker during the productive process. Workdays are demanding, extenuating and stressful, which leave little time for daily and periodic rest. Depending on the work area, tasks, involve five types of hazardous processes[7]. Problems, such as physical dynamic overload, are prominent, combined with static overload (as in post-harvest); repetitive movements; thermal fluctuations; exposure to noise; respiratory irritants; dermal irritation and fungal skin infections; and above all exposure to agrochemicals –occasionally acute and generally chronic and low intensity- is due to the improper use of highly dangerous substances (red and yellow label products), occasioned by the absence of plague alternative and integral management systems, and the ineffectiveness or nonexistence of protection mechanisms (deficiency in equipment; incorrect implementation of fumigation turns and modes). These problems are amplified in farms that are not subject to FLP program controls[8].

New rurality has brought about special overloads and problems among women, not only because of the "feminization of poverty", but also since peasant women have transformed into working women. Relationships based on old patriarchal dependence have been substituted, on account of the tearing apart of cultural communities, by relationships of submission to industrial work [López, 2004].

CEAS has designed an epidemiological interpretative model based on a critical processes matrix, which associates general floriculture production relations with flower workers' typical living styles, as well as specific impacts it has on people's organism and mental health [Breilh, 2004]. For the detection of main impacts, different test modules were designed[9] that

7. Their classification and explanation is developed in Breilh (2003) CDROM "SaludFlor": PDI: procesos físicos derivados de la condición de los medios; PDIIa: procesos emanados de la transformación de materia prima; PDIIb: Procesos de contaminación biológica; PDIII: procesos derivados de la exigencia física laboral; PDIV: proceso derivados de la organización del trabajo; PDV: instalaciones y equipos peligrosos.
8. The "Flower Label Program" (FLP) is an international program based on the implementation of guiding principles of labor, social, human and ecological protection rights, fostered by an association of European unions and NGO's; of which an Ecuadorian interdisciplinary team of the CEAS is in charge.
9. General questionnaire (socio-cultural; working conditions and exposure patterns); stress and mental illness; computerized neurobehavioral evaluation tests –NES2; laboratory blood tests (toxic impact in liver transaminases-; renal –serum creatinin-; blood marrow -hemoglobin, ferritine & transferrine- genetic instability – lymphocyte comet test-; erythrocyte acetylcholinesterase; control variables and nutritional condition.

covered nervous system toxicity problems; liver, cardiovascular, and renal impact; impact on bone marrow; genetic stability disturbance; impact on mental health.

Preliminary test data analysis yielded very high toxicity impact rates (see figure N° 4) in a representative sample of workers of both an FLP farm and a non-FLP farm[10]. From a preliminary analysis of databases being processed, the following concerns have been established. In the first place, a very high percentage of workers on both farms are exposed to hazardous elements and processes. This is the case particularly on 60% of the farms, which are those that do not pertain to the FLP program.

In the second place, quality and coverage of workers' protection equipment is limited, mostly in the farm that does not comply with international standards. In the third place, all types of health exams, high percentages of impacts on health were registered. Control and analytical variable analysis needs to be performed prior to answering the following question: How many of these problems are attributable to floriculture?

However, in this preliminary phase of analysis several worrying facts begin to be revealed: workers are affected in significant aspects of their health (arterial pressure, 52%; toxic anemia, 14%, low leukocytes, 12%; hepatic transaminase increase –inflammation-, 26%; genetic instability, 25%; neurotransmitter system enzyme reduction –acetylcholinesterase-, 23%[11]; and 69% showed clinical signs of toxicity, moderate and severe (refer to Figure N04). Furthermore, 56% were in a state of moderate and severe stress, and 43% of malnutrition (overweight); all which indicates that the workforce has bad health conditions. When analysis advances and we have community comparative data, we shall understand more thoroughly how much of this wide-ranging problematic is occasioned by floriculture; nevertheless, if we recall the higher proportion of contamination which exists in the floriculture zones and in the work settings of flower farms, we may estimate that an important part of these health problems could be due to irresponsible floricultural production.

Current mental suffering among workers studied reaches 38.8%, distributed between moderate suffering (24.4%) and severe suffering (14.4%). The index happens to be high if one considers that in an average population, it should not be over 20%. The mental vulnerability of this working population becomes evident when we analyze the results of the study on "local infant development self-valuation" applied to students of the Technical School of Cayambe, which reveals that the majority of young people investigated (70.21%) is classified as having limited infant development conditions [Campaña, 2005].

Neurological development of children who live in communities of the floricultural region is also affected. The mentioned neuro-motor development, already influenced by the living modes of peasant children (low income, malnutrition, maternal and paternal needs regarding their formal educational level, perspectives on nurturing, infant development and stimulation) is also stricken by exposure to pesticides [Handal, 2005].

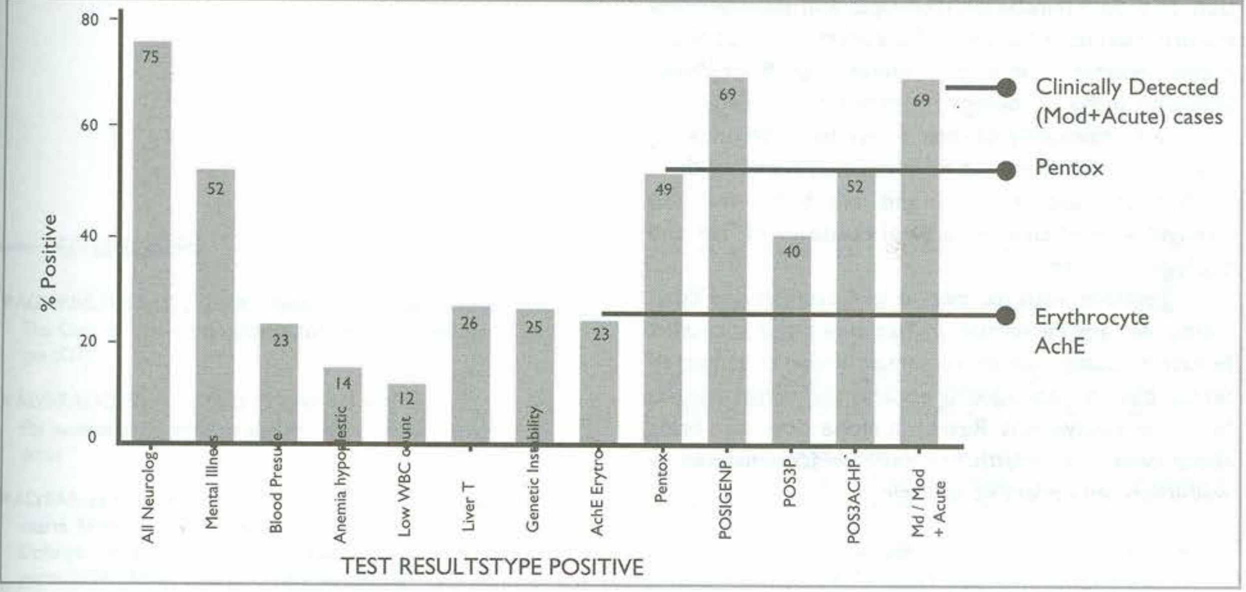
A Struggle for Fair and Ecological Floriculture

The EcoHealth program and the study of the Granobles River Basin has explored, since initial design

10. A representative simple random sample made of 71% of the total workers (n=160; out of N=225 total workers) selected from all sections (proportional probability).

11. Acetylcholinesterase reduction, as conventional exposure indicator used to evaluate workers´ health, does not provide de sufficient sensibility, according to our validation tests.

FIGURE No 4 DETECTED HEALTH PROBLEMS WORKERS TWO FARMS, 2003 n=160 (ECOHEALTH PROJECT CEAS/CIID)



workshops, the possibilities of an intercultural, transdisciplinary and participative construction of knowledge, rooted in an analysis of the power structure that conditions management, work with flowers, and community life. The central idea has been to perform research, with multiple subjects of knowledge and to triangulate the knowledge and instruments of academic and communitarian groups.

Once this first research phase is concluded, the next phase of intervention and incidence will be undertaken. Thus far, the project has constructed valuable tools from the perspective of communities' interest: a most relevant geo-codified database, with characterization and knowledge on impacts of flower production upon workers, communities, hydric systems and soils; a solid methodology for the sampling and discrimination of distinct contaminating productive sources; the validation of test modules to study the impact on human health and to demonstrate that conventional acetylcholinesterase exams are insufficient and tend to veil a broader chronic low intensity pathology, and to evaluate the effects on school and pre-school health; advancements in the implementation of community bioessay laboratories; CDROM software for workers' health clinical management and monitoring in farms; a rigorous system of verification (checking list) for the FLP program; the commencement of a campaign within the United States to foster support of flower consumers to put pressure for fair and ecological flowers.

All this effort, must be projected along the phase of incidence in the next years, to fortify the organization, awareness and advocacy of communities; the municipal and national juridical transformation on floriculture sustainable management norms; the organization of a communitarian, municipal and general floriculture monitoring system; the construction of alternative proposals for a non-monopolistic floriculture, centered in the wellbeing of communities and workers and the sustainability of their ecosystem; the updating of study programs on cut flowers ecosystem health, at various educational levels and scenarios; and the strengthening of an international campaign of "fair and ecological flower".

Together with the people of Cayambe and Tabacundo we are recreating in our work the idea that beauty of Ecuadorian flowers must not be constructed on the basis of reproducing poverty and threatening life in our ecosystems. Research alone does not bring about ecosystem health, but must be accompanied by well-informed collective struggle.

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