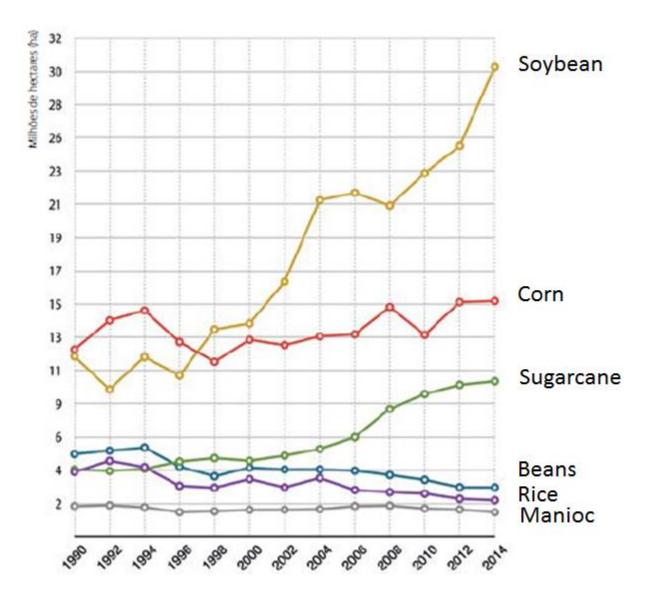
# Pesticides and impacts on human and environmental health: limitations of science and regulation

## Karen Friedrich

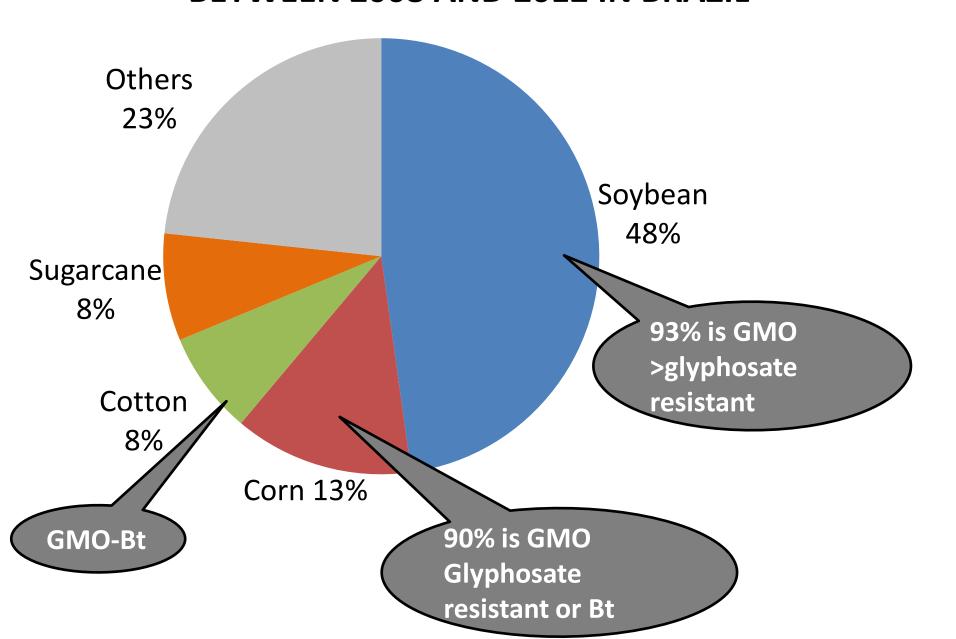
PHD Toxicology and Public Health
Oswaldo Cruz Foundation
National School of Public Health
Rio de Janeiro, Brazil
September, 2015

# LAND INTENDED FOR PLANTING COMMODITIES AND FOOD IN BRAZIL



Source: Carneiro et al, 2015. Dossie ABRASCO. http://www.abrasco.org/dossieabrasco/

# AVERAGE CONSUMPTION OF PESTICIDES PER CROP BETWEEN 2008 AND 2012 IN BRAZIL



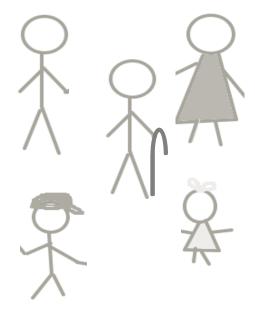
# **USE OF PESTICIDES**

- Commodities production and agribusiness
- Financial support of government
- GMO seeds
- Loss of biodiversity

### **Acute effects**

(IMMEDIATE)

Single exposure, usually to high doses



Chronic effects (LATE)

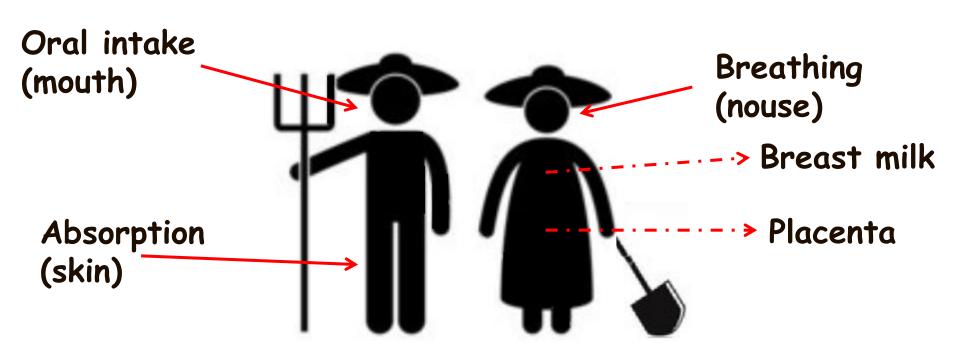
Multiple exposure, usually to low doses

Eye and skin irritation, rash, vomit, diarreia, cramps, breathing problems, seizures, death etc.

Infertility, impotence,
miscarriages,
malformations, endocrine
disruption, immunotoxicity,
cancer etc

# Exposure to pesticides

How pesticides entries in human body



Diseases, deaths, suicides

# HEALTH IMPACTS ON HEALTH DUE TO MULTIPLE USES OF PESTICIDES

Agriculture usage

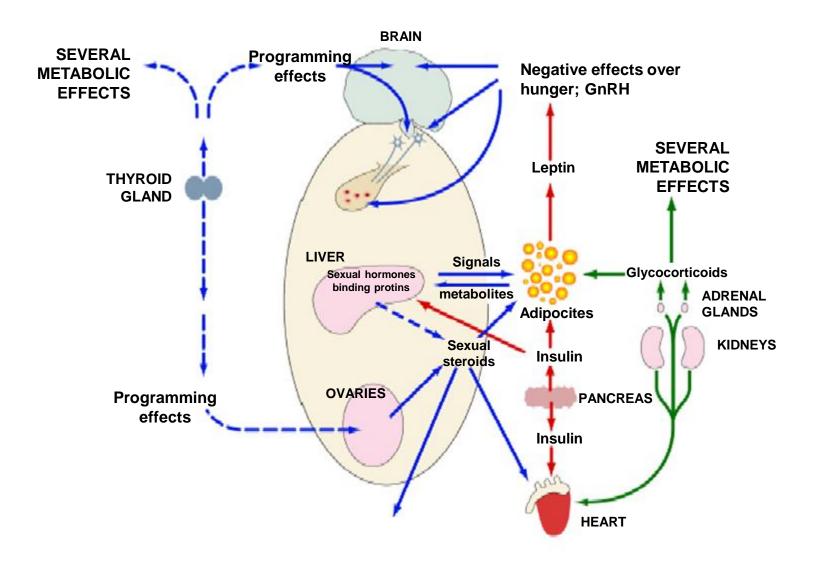
Non-agriculture usage



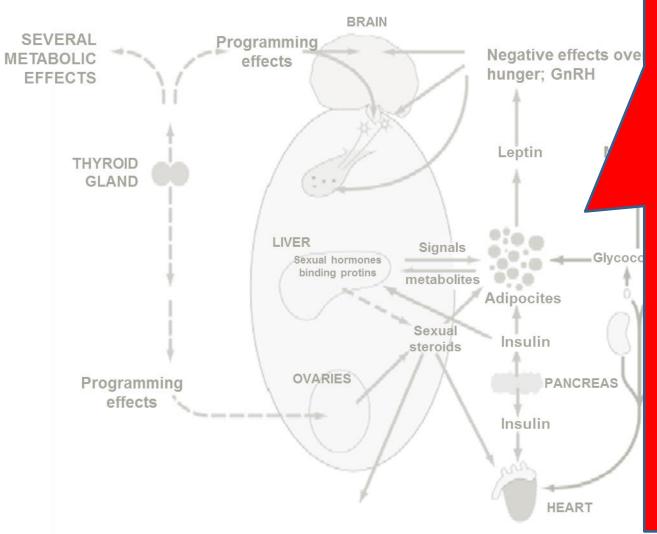


### **ENDOCRINE DISRUPTION DUE TO PESTICIDES**

### **HIPOTALAMUS-PITUITARY**



### **ENDOCRINE DISRUPTION DUE TO PESTICIDES**



Infertility,
miscarriage,
depression,
diabetes, obesity,
breast and thyroid
cancer etc

PREGNANCY AND LACTATION:
Damage to babies (mental and physical disorders) which may perseverate until adult life Cancer

# IMPACTS OF PESTICIDES IN BRAZIL

# Case studies

# Aerial drift of pesticides in soybean Indigenous Xavante, MT, December, 2012



### Map of state of MT

### Localização da terra indígena Marāiwatsédé, MT, Brasil, 2012





# IMPACTS ON PANTANAL MATO GROSSENSE







# Aerial drift of pesticides in corn over a Rural school Rio Verde, GO, May, 2013

Contiguidade da Escola Rural com a lavoura onde é realizada pulverização aérea de agrotóxicos: a escola vista de dentro da lavoura e pátio da escola, 2013



- 93 cases of intoxication (students, teachers)
- seizures, rash, vomit

Fotos: Murtlo Souza.

# Escola Municipal São José do Pontal, Rio Verde, Goiás,

03/05/2013, 9:00













# Escola Municipal São José do Pontal, Rio Verde, Goiás,

03/05/2013, 9:00





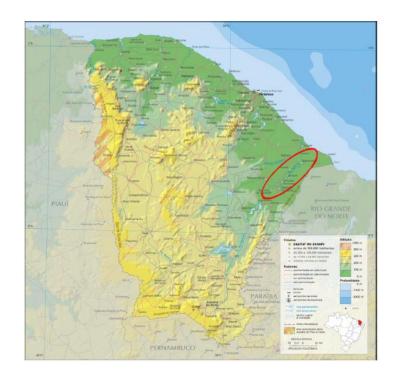




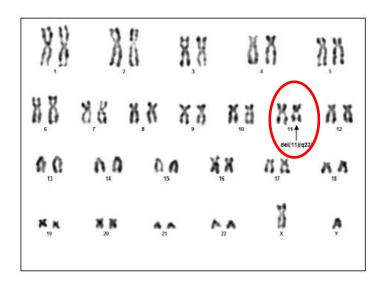




# Fruit production to exportation, Chapada do Apodi, CE, 2013



Damage to genetic material (13/43 cases)

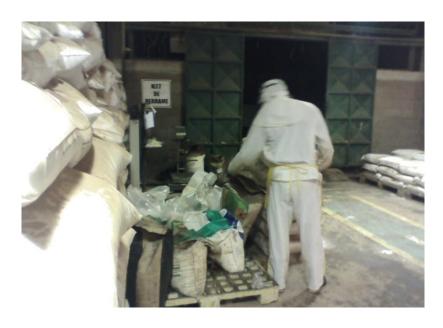


Pesticides cited by workers:

metamidophos, parathion, monocrotofos, propanil, 2,4-D

Source: Master degree thesis. Ferreira Filho, LI. Estudo das alterações citogenômicas da medula óssea de trabalhadores rurais expostos a agrotóxicos, Federal University of Ceará, 2013.

# Fruit production to export, Limoeiro do Norte, CE, 2008





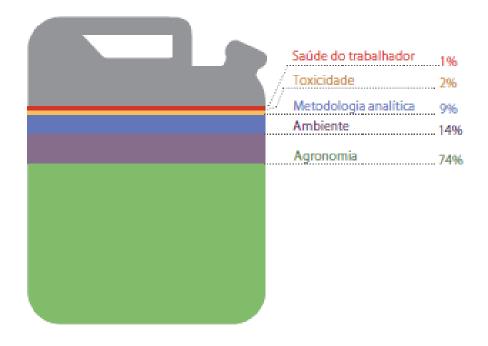
- Death of a worker (VMS)
- Male, 31 years old
- Preparation of pesticides, 10 hours/day working hours, 60 hours/week
- Chronic hepatic disease due to pesticides

Source: Article in submission. Raquel Maria Rigotto , Ada Cristina Pontes Aguiar. Hepatopatia crônica com desfecho letal em trabalhador do agronegócio na região do Baixo Jaguaribe (CE)

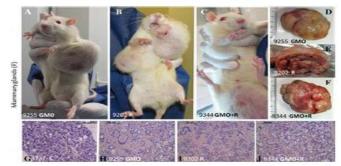
# Limits of science

Types of studies about glyphosate performed in Brazil (2007-2012)

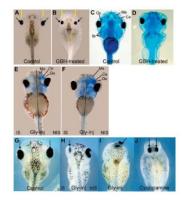
Figura 3.8 - Categorias dos estudos utilizando o glifosato no Brasil (%)



Exemplos de tumores mamários observados em fêmeas



Fonte: SÉRALINI et al. (2014b).











Uma verdade cientificamente comprovada: os agrotóxicos fazem mal à saúde das pessoas e ao meio ambiente

Historicamente, o papel da Fundação Devaldo Cruz (Flocruz), do Instituto Nacional de Câncer José Alencar Gomes da Silva (Inca) e da Associação Brasileira de Saúde Coletiva (Abrasco) é de produção de conhecimento científico pautado pela ética e pelo compromisso com a sociedade e em defesa da saúde, do ambiente e da vida. Essas instituições tiveram e têm contribuição fundamental na construção e no fortalecimento do Sistema Único de Saúde.

Quando pesquitas desenvolvidas nas referidas instituições contrariam interesses de negócios poderosos, incluindo o mercado de agretóxicos, que movimenta anualmente bilhões de reais, eventualmente elas sofrem ataques ofensivos que, transcendendo legitimo debate público e científico, visam confundir a opinião pública utilizando subterfúgios e difamações para a defesa emanutenção do uso de substâncias perigiosas à saúde e a meio ambiente.

# PRODUÇÃO AGROECOLÓGICA INTEGRADA E SUSTENTÁVEL Total de signal de forma que del direct amento plus del constitución de los de constitución de los del constitución del constitución

# CICLO PRODUTIVO DA TECNOLOGIA SOCIAL PAIS

Reflorestamento Anea de compostagem Mandiota Horta Erreno. Caina dágua Energia Fonte de água Comercialização Associativismo

# Limits of regulation

- Experimental tests don't predict the diversity of effects that can happen in real life
- Use of mixtures and presence of adjuvants and other components may increase toxicity
- Industry and civil society asymmetrical forces over regulatory agencies

### RISK ASSESSMENT (OR RE-ASSESSMENT)

1st: Studies performed by industry (according to GLP)

- in vitro studies (cells, tissues)
- in vivo studies (laboratory animals)

2nd: Newly published studies

- Epidemiological studies
- Wild animal studies

PROHIBITION RESTRICTION MAINTAIN

### **CIPERMETHRINA**

- Male reproductive system impairment in rats (Mani et al, 2002; Elbetieha et al, 2001; Wang et Al, 2010; Ahmad et al, 2009)
- Neurobehavioral diseases in rats (McDaniel; Moser, 1993; Soderlund et al, 2002; Wolansky; Harrill, 2008)

# <u>CHLORPYRIFOS</u>

- Thyroid hormones impairments im mice after in utero exposure (Haviland et al, 2010; De Angelis et al, 2009)
- Intereference on male reproductive system (Joshi, Mathur, Gulati, 2007)

### **PROFENOFOS**

- Genetic damage (Prabhavathy et al, 2006; Fahmy; Abdalla, 1998)
- Male reproductive system impairments in rats (Moustafa et al, 2007)

### **PERMETHRIN**

- Association with multiple myeloma in man (Rusiecki et al, 2009) and possible carcinogen (US EPA)
- Neurobehavioral (rats) (Abdel-Rahman et al, 2004)

# CONCLUSIONS



Source: Almanaque do Baixo Jaguaribe, Grupo Tramas, Universidade Federal do Ceará, 2012

- From a public health and a toxicological point of view ALL kind of pesticide use should be condemned
- There are alternative ways of producing FOOD which should be sponsored by governments
- Economic interests never should overlap HEALTH AND ENVIRONMENTAL protection