

Literature review about presence of pesticides in organic fruits and vegetables in front of conventional agriculture.

Gich Cortada, Artur

INTRODUCTION

The presence of pesticides is an issue that concerns society due to the possible harmful effects on human health. For a large part of society, the consumption of organic food is linked to the absence of pesticides, but some reports suggest the contrary.

OBJECTIVES

Review scientific literature comparing pesticides contamination present in organic fruits and vegetables in front of conventional agriculture.

MATERIAL AND METHODS

I searched MedLine with a set of terms based on four main blocks: I) "pesticides", II) "agriculture", III) "Organic" and IV) "conventional"

I combined these terms and blocks with Boolean operators. I excluded reviews and systematic reviews, focusing on original articles.

CONCLUSIONS

Organic fruits and vegetables contain less pesticide than conventional foods. However organic foods in many cases contain pesticides and the numbers of samples exceeding the MRL are higher compared to conventional foods (0.1% compared to 1.4%). It should be noted that most positive presence in pesticides in organic foods are persistent pesticides such as organophosphates and organochlorines, so these could be come from its previous use, before the ban and not used directly by the organic method.

RESULTS

The search yielded 229 references and 3 additional studies through a manual review. Of these finally I've selected 7 studies; the rest did not fit with the review inclusion criteria.

Results are shown in the table. The risk difference shows the presence of pesticides in both types of production methods. The greater presence in conventional food is coloured in green, when it is bigger in ecological foods, is coloured red. If it is equal, is coloured yellow. When that presence exceeds the maximum residues limits (MRL) I mark in the table the number of samples that exceed this limit.

Type of Study/Design	Reference	Food	Pesticide	Results (n presence/n total)		Excess MRLs	Risk Diff	Sig.
				Organic	Conventional			
Meta analysis	Spangler (2012)	Fruits and vegetable Not spe.		253/3041 (8,32%)	45184/106755 (42,3%)	2 studys show excess:	-30%	p < 0,001
				63/803 (7,85%)	39/1454 (2,68%)	Organic: 6% (60 of 1048 studys)	5,20%	p = 1
				384/713 (53,86%)	79/1641 (4,82%)	Conventional: 2% (179 of 2237 studys)	5,70%	p = 0,93
				267/393 (67,94%)	310/347 (89,3%)	Organic: 1% (1 de 226 studys)	-21,40%	p = 0,043
Direct analysis	Gonzalez (2005)	Enciam	OC	7,64 ng/g pes sec	5,86 ng/g dry weight	No sample exceeded	---	---
				4,19 ng/g pes sec	3,51 ng/g dry weight	No sample exceeded	---	---
	Turgut (2011)	Grape	Lambda-cyhalothrin (Piretroide nd		15/45 (33,3%)	Conventional: 4 samples	-33,00%	Not spe.
			Chlopyrifos methyl i ethyl (OP) nd		9/45 (20%)	Conventional: 4 samples	-20%	Not spe.
			Deltamethrin (Piretroide) nd		9/45 (20%)	Conventional: 1 sample	-20%	Not spe.
	Mansour (2009a)	Cucumber	Lindane (OC)	9/36 (25%)	12/36 (33,3%)	No sample exceeded	-8,30%	Not spe.
			Methamidophos (OP)	18/36 (50%)	24/36 (68%)	No sample exceeded	-18%	Not spe.
			HCB (OC)	15/36 (41,7%)	3/36 (8,3%)	Organic: 14 samples (38,9%)	33,40%	Not spe.
			Thiometon (OP)	9/36 (25%)	9/36 (25%)	Conventional: 3 samples (8,3%)	0%	Not spe.
			Pirimiphos-me (OP)	9/36 (25%)	3/36 (8,3%)	Organic: 2 Samples (5,6%)	16,70%	Not spe.
			Phorate (OP)	9/36 (25%)	nd	Organic: 1 sample (2,8%)	25,00%	Not spe.
			Chlopyrifos-methyl (OP)	9/36 (25%)	nd	Organic: 1 sample (2,8%)	25,00%	Not spe.
	Mansour (2009b)	Potato	HCB (OC)	6/36 (16,7%)	15/36 (41,7%)	Organic: 6 samples (16,7%)	-25%	Not spe.
			Lindane (OC)	6/36 (16,7%)	18/36 (50%)	Conventional: 12 samples (33,3%)	-33,33%	Not spe.
			Methamidophos (OP)	18/36 (50%)	21/36 (58,3%)	No sample exceeded	-8,30%	Not spe.
			Phorate (OP)	9/36 (25%)	3/36 (8,3%)	Organic: 3 samples (8,3%)	-16,70%	Not spe.
			DDD (OC)	15/36 (41,7%)	21/36 (58,3%)	Conventional: 3 samples (8,3%)	-16,60%	Not spe.
			DDT (OC)	9/36 (25%)	6/36 (16,7%)	No sample exceeded	8,30%	Not spe.
			Heptaclor (OC)	9/36 (25%)	12/36 (33,3%)	Organic: 9 samples (25%)	-8,30%	Not spe.
			Pirimiphos-me (OP)	3/36 (8,3%)	9/36 (25%)	Conventional: 12 samples (33,3%)	-16,70%	Not spe.
			Dialetrin (OC)	3/36 (8,3%)	12/36 (33,3%)	Conventional: 5 samples (13,3%)	-25%	Not spe.
	DDBB: CDPR	Winter (2006)	Fruits and vegetable Not spe.	7/11097 (6,5%)	20477/66057 (31%)	Not spe.	-24,50%	Not spe.
				18/67 (27%)	54/68 (79%)		-52%	Not spe.
US data sets	Baker (2002)	Fruits	Not spe.	7/30 (23%)	10392/12612 (82%)		-59%	p < 0,001
			Not spe. (exceptuant OCP)	7/30 (23%)	10287/12612 (82%)		-59%	p < 0,001
		Vegetables	Not spe.	22/97 (23%)	9093/13959 (65%)		-42%	p < 0,001
			Not spe. (exceptuant OCP)	9/97 (9%)	8465/13959 (61%)		-52%	p < 0,001

OC: Organochlorine BBDD: Database Sig: Significance MRL: Maximum Residue Limits
OP: Organophosphat CDPR: program of the California Dept. of pesticid Not spe: not specific Dif.Risc: Risk difference