

Supplementary Material for “Sowing uncertainty: What we do and don’t know about the planting of pesticide-treated seed”

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Description of the Agricultural Resource Management Survey (ARMS) questions on seed treatments

In the cotton and corn surveys, the question on seed treatment contained three parts as follows: “Did you purchase seed treated with: a) a fungicide, b) an insecticide, c) a nematocide.” The farmer was then asked to list the particular seed treatment product by entering the product code from a list of seed treatment products. In the wheat survey, the farmer was not asked to distinguish between fungicides, insecticides, and nematocides, but whether the farmer “purchase[d] pre-treated seed or [had] the seed treated after purchase with a fungicide or insecticide.” In the soybean survey, the farmer was asked whether the soybeans seed was “1) treated with a pesticide prior to purchase, 2) treated with a pesticide after purchase, or 3) not treated with a pesticide.” Similar to the cotton and corn surveys, the wheat or soybean farmer was then asked to list the seed treatment product by entering a product code. The soybean survey in 2018 was the first to include a response code for the case that the farmer does not know the seed treatment.

Pesticide-use data collection at the state level

Table S1. Examples of U.S. states that report information regarding pesticide use.

State	Description and URL ¹
California	California was the first state to require comprehensive reporting of agricultural pesticide use. Reports are provided on a monthly basis to individual county agricultural commissioners, which is then provided to the CA Department of Pesticide of Regulation. Data on the planting of treated seed are not collected. Information is provided via the “California Pesticide Information Portal”, as well as requesting annual reports using email, or from the DPR’s FTP portal. https://www.cdpr.ca.gov/docs/pur/purmain.htm

- Minnesota The Minnesota Department of Agriculture publishes annual pesticide sales data by pesticide active ingredient. As indicated by the MDA, these data are not the same as use data given products may not be applied in the same year that they were sold. There are some reports that provide pesticide use data in major crops, although in terms of seed treatments, the information is limited.
<https://www.mda.state.mn.us/pesticide-fertilizer/pesticide-use-sales-data>
- New Jersey Pesticide surveys were conducted as part of the New Jersey Information Network for Pesticides & Alternative Strategies (NJinPAS), though NJinPAS has since been archived. Data are summarized and presented in reports indicating pesticide amounts in pounds active ingredient but not summarized by specific crop.
<http://njinpas.rutgers.edu/pesticidesurveys.htm>
- New York The New York State Department of Environmental Conservation provides annual reports of pesticide applications and sales for the period 1997-2013. The information is summarized for pesticide applications by volume and weight and also for pesticide sales by the same measures. Since 2014, data are from Cornell University Cooperative Extension.
<https://www.dec.ny.gov/chemical/97535.html> and <http://psur.cce.cornell.edu/>
- North Dakota North Dakota State University, in collaboration with the ND Department of Agriculture and USDA-NASS, has published pesticide use data based on farmer surveys in the years 1978, 1984, 1989, 1992, 1996, 2000, 2004, 2008, and 2012. The published reports contain information on acres treated and active ingredients by ND region and crop as well as the use of seed treatments and whether the treatment occurred on- or off-farm.
<https://www.ag.ndsu.edu/weeds/nd-herbicide-weed-surveys>

¹ All URLs were verified on 19 January 2020.

Pesticide-use data collection in Europe by private industry

Table S2. Seed treatment data available in Kleffmann Group's global database by country, crop, and year.

Country	Crop	2011	2012	2013	2014	2015	2016	2017	2018	2019
Australia	Cereals									
	general					yes		yes		
	Oilseed rape					yes	yes	yes		

Belarus	Cereals general				yes	yes	yes	yes
	Maize					yes	yes	yes
	Soya					yes	yes	yes
	Oilseed rape					yes	yes	yes
	Leguminosae				yes	yes	yes	yes
	Beets					yes	yes	yes
Bulgaria	Potatoes					yes	yes	yes
	Cereals general					yes	yes	
Czech Republic	Cereals general		yes	yes		yes	yes	yes
Germany	Cereals general			yes		yes	yes	yes
	Potatoes		yes	yes	yes	yes	yes	yes
Great Britain	Potatoes					yes	yes	
Hungary	Cereals general		yes	yes	yes	yes	yes	yes
Kazakhstan	Cereals general	yes	yes	yes	yes	yes	yes	yes
	Sunflower		yes		yes	yes		
	Soya						yes	yes
	Oilseed rape		yes	yes	yes	yes		
	Leguminosae						yes	yes
	Potatoes				yes	yes	yes	yes
Moldova	Cereals general					yes		
Pakistan	Cotton	yes						
Poland	Cereals general	yes	yes	yes	yes	yes	yes	yes
	Potatoes	yes	yes	yes	yes	yes	yes	yes
Romania	Cereals general			yes	yes	yes	yes	
	Oilseed rape						yes	yes
Russia	Cereals general	yes	yes	yes	yes	yes	yes	yes
	Sunflower	yes	yes	yes	yes	yes	yes	yes
	Maize	yes	yes	yes	yes	yes	yes	yes
	Soya	yes	yes	yes	yes	yes	yes	yes
	Oilseed rape	yes	yes	yes	yes	yes	yes	yes
	Leguminosae	yes	yes	yes	yes	yes	yes	yes
	Beets	yes	yes	yes	yes	yes	yes	yes
	Potatoes	yes	yes	yes	yes	yes	yes	yes
	Special crop	yes				yes	yes	yes
Rice			yes	yes	yes	yes	yes	
Slovakia	Cereals general		yes	yes		yes	yes	yes
Switzerland	Potatoes			yes				

Turkey	Cereals general			yes	yes	yes	yes	yes	yes
Ukraine	Cereals general	yes	yes	yes	yes	yes	yes	yes	yes
	Sunflower	yes	yes	yes	yes	yes	yes	yes	yes
	Maize	yes	yes	yes	yes	yes	yes	yes	yes
	Soya	yes	yes	yes	yes	yes	yes	yes	yes
	Oilseed rape	yes	yes	yes	yes	yes	yes	yes	yes
	Beets		yes	yes	yes	yes			
	Potatoes	yes	yes	yes	yes	yes	yes	yes	yes

Source: Kleffmann Group (2020). Email communication with Andras Marfi, Global Key Account Manager.

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