The Effect of Particle Size of Planting Machine Lubricants on Pesticide Abrasion from Corn Seeds

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The decrease in honeybee colonies is linked to many factors, including pesticides that are used in agricultural areas. When planting a cornfield, a lubricant is combined with pesticide-coated corn seeds before they are loaded into a planting machine. The pesticides rub off of the corn seeds and on to the lubricant that is then exhausted into the air. From there it can spread into honeybee habitats as a lethal substance. My hypothesis is that lubricants with smaller particle sizes and more abrasive shapes will remove more pesticide from the corn seeds, causing greater potential harm to the honeybee colonies. In addition to testing two commonly used lubricants, talc and graphite, a new Bayer CropSciences talc substitute (“Fluency Powder”) was also tested to determine how it compares to the lubricants already on the market. The area and circularity of the lubricant particles were measured with a Nikon Eclipse 90i microscope. Additionally, samples were collected by shaking the lubricants with pesticide-coated corn seeds in tin canisters to mimic the motion of a seed box in a planting machine. The concentration of pesticides on each lubricant was then measured using a HPLC-MS-MS instrument. Results show graphite had the smallest particle size and also removed the greatest amount of pesticide. The talc substitute removed more pesticide from the corn seed than the normal talc; however, the talc substitute had much larger particle sizes than the normal talc. This indicates that particle size is not the only factor associated with pesticide transfer. Future investigations should evaluate other physical properties of the lubricant materials, such as strength and brittleness. Additionally, future investigations should consider the amount of dust produced by each lubricant.

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