Table 1. Examples from agriculture of the three dimensions of power according to Steven Lukes

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| **Dimension of Power** | **Example** |
| First dimension: Decision-making power (power over).  For example, using legal instruments to gain market advantages. | In 1970, the US Congress enacted the Plant Variety Protection Act (PVPA) giving agricultural innovators limited protection for sexually reproduced plants through Certificates of Protection (PVP certificates). However, it allowed farmers to save seeds from one season for replanting in successive seasons. Agricultural innovators continued to push for patents to prevent farmers from saving seeds, and in 1985 the first seed was patented. It was a contested decision but was upheld by the Supreme Court in 2001. Monsanto (acquired by Bayer in 2018) created the Roundup Ready seeds in 1996 and rapidly gained almost a monopoly of seeds for soybean in several countries (Brazil 93%, Argentina 100%, USA 93%). Between 1997 and 2012 Monsanto filed 144 lawsuits against farmers for patent infringement, and many more threats of lawsuits. Only 11 of the lawsuits were taken to court of which Monsanto won all (Benbrook, 2016; Fitzgerald, 2010; Gillam, 2012; Winston, 2008). As early as 2003 Monsanto had 75 employees dedicated to patent infringement processes (Barker et al., 2013).  Another recent example is how the leading agricultural machinery company, John Deere, monopolizes the repair service market by preventing farmers and independent mechanics from repairing the machinery they have purchased. In January 2022 a class action against John Deere was filed by a farming corporation in North Dakota (US District Court Northern District of Illinois Eastern Division, 2022).  We see these two cases as examples of using the overwhelming legal resources of the firms for exerting power over farmers. |
| Second dimension: Non-decision-making power (power to prevent/preempt).  This kind of power is often manifested as attempts to set the agenda of various decision-making forums. | The approval for use of glyphosate in the EU has been up for renewal since 2022 and was granted in November 2023. A group of large chemical firms created an initiative (Glyphosate Renewal Group, GRG) for the purpose “to seek the renewal of the EU authorization of the active substance glyphosate in 2022 by joining resources and efforts to prepare a single dossier with all the scientific studies and information on the safety of glyphosate” (<https://www.glyphosate.eu/>). Because their aim is explicitly to “seek renewal” of the substance, the scientific studies are from the outset biased towards the ones that are favorable for continued use. For example, only two articles discussing the links between glyphosate use and honeybees were deemed relevant and reliable by GRG (EU Commission, 2020) despite over 100 published papers identified by Web of Science on this subject. We see this as an attempt to remove environmental concerns from the approval agenda while focusing on concerns for human health (where evidence is less clear). |
| Third dimension: Ideological power (power to influence interest perception)  This kind of power is closely related to Gramsci’s concept of hegemony, the idea that “man is not ruled by force alone, but also by ideas” (Bates, 1975). | Language is ideologically powerful, and the treatment of weeds is a good example. The definition of some plants as weeds (“*a plant which in a particular place at a particular time arouses human dislike*” (Dwyer, 2011)) is commercially powerful and is the basis of a whole industry. A “*perfect weed*” (Baker, 1965) is a plant with multiple traits that could be described as beneficial if we take an ecological perspective.  Science is an important arena for promoting ideological power. A subtle way to promote a particular interest is through the formulation of the research question. As an example, the journal *AgBioForum* published an article, funded by Monsanto, asking what the costs would be to farmers in Asia if they had to stop using the herbicide glyphosate. The study shows that the consequences would be both costly and result in a “net poorer environmental outcome” (Brookes, 2020b). The author, who repeatedly publish unilaterally on the benefits of GM crops on behalf of the agrochemical industry (Brookes, 2020a, 2022; Brookes & Barfoot, 2015, 2018, 2020; Brookes & Dinh, 2021), is a consultant working for a consultant company with biotechnology industries as clients. The *AgBioForum* is a journal that is funded by the Illinois-Missouri Biotechnology Alliance, an organization whose purpose is “*to fund biotechnology research … directed at expanding the volume of profitable businesses in the US food and agricultural sector*” (USDA REEIS, n.d.)  Euphemisms are often created by the agrochemical/seed industry as a means of creating a more positive connotation, for example pest control is called plant protection (Triantafillou, 2001). The term “integrated” has a positive connotation and is frequently used in agriculture, for example Integrated Pest Control, Integrated Pest Management, Integrated Fruit Production, and Integrated Farm Management (Deguine et al., 2021).  Below are some examples of how the seed & agrochemical industry is creating euphemisms based on “*integrated solutions*” to forge strong links between three products offered by these firms: seeds, agrochemicals, and data services:  “*our tailored solutions, like seeds and traits, crop protection, and digital tools, we’re offering farmers better answers to meet the specific needs of their farms*” (Bayer Crop Science homepage)  “*a balanced and diverse mix of seed, crop protection and digital solutions focused on maximizing productivity to enhance yield and profitability*” (Corteva homepage)  “*current research and development strategy and commercial priorities are focused on bringing our farmer customers integrated yield solutions through our innovative platforms in plant breeding, biotechnology, chemistry, biologicals and data science*.” (Monsanto, Annual Report 2017)  The rhetoric claims that integrated solutions are a way to substantially reduce the use of agrochemicals, but the industry forecasts a substantial increase of the agrochemical market in the coming years, 28% growth from 2021 to 2030 (Statista, 2023). |

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