Biotech on the Farm: Mississippi Agriculture in an Age of Proprietary Biotechnologies

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Abstract: Agricultural biotechnologies have been introduced with a number of proprietary mechanisms: patents on seeds, grower contracts, incentive agreements and even litigation. Scholarly research on this proprietary framework's impact on power relations in agriculture has primarily focused on developing countries. This article draws on 40 interviews conducted in the agricultural community in Mississippi, United States, to investigate the technologies' impact on agricultural production, and farmer's response to this impact. I find that farmer's control over their production is reduced in important ways, limiting their opportunities for strategic response, but some acts of resistance in the legal forum are having a limited impact.

Keywords: biotechnology, agriculture, proprietary, patents, political economy

Résumé : Les biotechnologies agricoles ont été implantées avec un certain nombre de mécanismes de propriété intellectuelle : brevets sur les semences, contrats de culture, conventions incitatives et même poursuites judiciaires. La recherche académique sur l'impact de cet encadrement de propriété intellectuelle sur les rapports de pouvoir en agriculture s'est concentrée principalement dans les pays en développement. Le présent article s'appuie sur 40 entrevues menées dans la communauté agricole du Mississippi, aux États-Unis, pour qualifier l'impact des technologies sur la production agricole, et la réponse des agriculteurs à cet impact. J'ai trouvé que le contrôle des fermiers sur leur production s'est trouvé restreint de manière importante, ce qui limite leur capacité de réponse stratégique, tandis que certains gestes de résistance dans l'arène légale obtiennent un impact limité.

Mots-clés : biotechnologie, agriculture, propriété intellectuelle, brevets, économie politique

Introduction

The phenomenon of globalization is contested on the grounds of its extent, inevitability, and even novelty. Even if globalization is an ideologically driven political project, as many increasingly now characterize it (for example, McBride and Shields 1997; McMichael 2004; Urmetzer 2005), subscription to it nonetheless entails some very real ground-level conditioning. Regulatory reform for trade liberalization is at the heart of this conditioning. With respect to agricultural biotechnologies, this is evidenced in a strengthening of intellectual property rights, a retrenchment of public breeding, and an overall weakening of regulatory oversight. Seemingly nowhere has this reform been so unrestrained as in the U.S. Nonetheless, research on the potential social impacts of agricultural biotechnologies has largely focused on developing countries. Scholars and social movement actors have highlighted numerous inequities from introducing high capital agricultural biotechnologies to developing countries: the capture of developing country genetic resources as a form of recolonization, the technologies' unsuitability for developing country needs, and the inappropriateness of their proprietary aspects for low income countries, to name a few (see Arends-Kuenning and Makundi 2000; Barton and Berger 2001; Fitting 2008; Gonsalves et al. 2007; Howard 2000; Shiva 2001; Teubal 2008).

Given that the U.S. is a driver of the new biotechnologies—both with respect to being at the forefront of technological development and with respect to their rate of adoption—it appears to be in an assumed position of privilege, and impacts in that country have garnered far less scholarly attention. New laws and contractual obligations associated with agricultural biotechnologies indicate that significant changes are occurring in the agricultural systems of developed countries such as the U.S., however: patents on seeds, prohibitions on seed saving, grower contracts, and a rise in litigation between

technology developers and agricultural producers all suggest that a social reorganization of agriculture may be occurring, whereby ownership and control over agricultural production is expropriated from farmers and shifted to corporations. Despite these rapid changes associated with the technology, we know little of the experiences of those who actually use it. Important work can be found on structural shifts occurring in the agrifood system and on how agricultural biotechnologies increasingly affect these structural systems (see, for example, Kloppenburg 2004; Mascarenhas and Busch 2006; McMichael 1992; Wilkinson 2002), but studies that include the perspectives of farmers in developed countries are largely lacking, with some few exceptions (for example, Mauro and McLachlan, 2008; and, related, Müller 2008).

This paper seeks to address this gap by seeking the perspective of farmers from Mississippi to answer: to what extent have the proprietary aspects of agricultural biotechnologies facilitated a social reorganizing of agricultural production, and what effect does any such reorganization have on farmers' control over their production? Intimately related to the discussion of a social reorganization of agricultural production are the questions of the technologies' broader social worth and potential negative environmental and health impacts, and even their long-term viability in the face of weed and insect resistance. While these are important considerations for a social evaluation of the technologies, they are beyond the scope of this paper.[1]

The research for this paper was conducted as part of a larger, comparative investigation between Saskatchewan, Canada and Mississippi, U.S.A. These regions were selected primarily because there was important litigation between farmers and technology developers which could be revealing of the direction in which the proprietary framework for agricultural biotechnologies was developing. In Mississippi, *Monsanto Co. v. McFarling* and *Monsanto Co. v. Scruggs* have the hallmarks of such cases for reasons which will be discussed. Furthermore, Mississippi had a disproportionately high number of such cases, further supporting it as a region of interest. An important secondary consideration was the degree and significance of exposure farmers had to biotechnologies, which, as will be discussed, is considerable in Mississippi.

The data for this research was drawn from 40 personal interviews, conducted during a visit to Mississippi in May and June 2005, a subsequent email interview with a representative from the Monsanto Company, and court reports and related legal documents. Interviews were face-to-face and semi-structured, and subjects included those directly involved in litigation (i.e., litigants and lawyers), as well as those involved in agriculture more broadly: producers, seed dealers, knowledgeable informants (for example, extension agents, farm media), and stakeholder organizations (for example, farm bureau, sustainable agriculture organizations). Respondents were selected either for their role as representatives of key institutions or by a targetted snowball technique (to include consultants, seed dealers, etc.). While not statistically generalizable, referrals were sought from diverse sources to reduce bias, and farmers were sought from the large-scale, highly industrialized delta region as well as the smaller-scale enterprises predominantly in the hills. Subsistence farmers were not included.

The first section of this paper will briefly discuss the political economy of agriculture literature in order to provide a theoretical context for the relationship between technology developers and farmers, and to present my argument for where political economy concepts fall short with respect to the new technologies. I suggest the addition of a new term, "expropriationism," to address this conceptual deficit. This section also briefly outlines the national and supranational regulatory structure that mediates the relationship of producers to the new biotechnologies. In the second section, I draw on the interview data to discuss both farmers' motivation for adopting biotechnologies and their frustration and concern over the conditions of that adoption. In the third section, I consider the question of resistance, broadly conceptualized. While farmers give full voice to their objections to their changing conditions, is there any orchestrated action to resist these changes, or even individual acts of opposition? I argue that the greatest effort to change the increasingly institutionalized power imbalance between technology developers and farmers is evident in the small number of seed saving cases that proceed to litigation. I conclude with suggestions for future research.

Agriculture in Theoretical Perspective

As anyone who has stood beside a modern combine can attest, despite the old-time feel of the countryside, agriculture in the U.S. has developed significantly from the past. Providing a theoretical perspective for a system that straddles the modern and the ancient has proven to be difficult. While some scholars cast agriculture under broad theories of industrialization, the most analytically productive works are those that acknowledge the natural limitations to agriculture's full-scale industrialization. As argued by Goodman and Watts (1994), attempts to wash over the specifics of agriculture with the "gloss of Fordism" and other such broadly applied industrialization conceptualizations overlook important exceptions that need to be

explained. These exceptions result from agriculture's inseparability from nature and its processes, such as land, weather, photosynthesis and gestation cycles. The conceptual tools of appropriationism and substitutionism developed by Goodman, Sorj and Wilkinson (1987) overcome this conceptual distortion by specifically focusing on how capital accumulation could occur in agriculture despite its particularities. As a consequence, they have proven to be very important means of addressing agriculture's exceptionalism, up to and including many of the changes initiated by the new agricultural biotechnologies.

Goodman et al. (1987) argue that as agriculture could not be brought wholesale under the control of capital, given its grounding in the natural processes of the earth, capital had to pursue a piecemeal and discontinuous path of agricultural industrialization through two means: appropriationism and substitutionism. Appropriationism is defined as the "discontinuous but persistent undermining of discrete elements of the agricultural production process, their transformation into industrial activities, and their re-incorporation into agriculture as inputs" (Goodman et al. 1987:2). A prime example is the replacement of horse manure with commercial fertilizer. Substitutionism follows a similar process, but replaces agricultural end products with industrial ones, reducing agricultural products to inputs for the processing sector. The substitutions of frozen "oriental vegetable medley" for fresh produce, or margarine for butter, are cases in point. Biotechnology has now vastly expanded the potential for capital accumulation in agriculture by enhancing capital's ability to bring nature under even greater industrial control. Agricultural biotechnology applications open the door to new appropriation strategies—as we have already seen with herbicide tolerance and insect resistance—and a seemingly limitless array of substitution strategies, as biological catalysts facilitate the reduction of crops to their (substitutable) components for input into the food-processing sector or for industrial applications.

While agricultural biotechnologies deepen and extend the potential for appropriationism and substitutionism in agriculture, there are indications that this is not the only means by which they are facilitating capital accumulation. Jack Kloppenburg (2004) argues that capital accumulation in agriculture has been impeded by nature's obstruction to the commodification of the seed (that is, its reproducibility). As a consequence, capital has attempted to commodify the seed through two routes: one technical (i.e., physical impediments to reproduction, such as hybrid technology) and the other social (i.e., legislation to protect plant breeders, such as the Plant Variety Protection Act). Cast more broadly than with respect to the commodification of seeds, the host of legal and contractual conditions associated with agricultural biotechnologies suggest that another social route to accumulation is opening up. For example, with some variation by crop, place and time, Monsanto's required Technology Use Agreement binds farmers to a number of contractual provisions in addition to setting the technology fee and restricting seed saving: farmers must agree to only sell their crop to approved processors; they consent to the inspection of their fields for a set number of years; they agree that any disputes will be settled in the jurisdiction of Monsanto's hometown of St. Louis, Missouri; and they agree that any infraction will be penalized by 120 times the actual damages. This is only one of a number of proprietary changes associated with the new biotechnologies, as will be discussed. Early indications suggest that these changes are actually shifting control over agricultural production from farmers to biotechnology developers, with an associated shifting of economic benefit.

In short, the strategies of appropriationism and substitutionism have historically acted to minimize the economic significance of agriculture and of its producers in the production of agriculture-based end products. The latter have been increasingly sandwiched between the accumulation strategies of both the input and output sectors, where the "real" capital accumulation occurs. These strategies of appropriationism and substitutionism may now be joined by a third—for which I suggest the term "expropriationism"—in order to explain capital accumulation in agriculture through the use of laws, contracts and other legal mechanisms associated with biotechnologies. That is, I define expropriationism as a form of accumulation by legal means cast broadly. To specify, it is defined less by an individual legal mechanism—although, patenting seeds is certainly a central component of it—than by the confluence of legal mechanisms and processes that weave together to shift the relationship between technology developers and farmers in a way that facilitates the former's accumulation strategies. To a certain extent, many of expropriationism's features are not unprecedented—even patents on seeds preceded agricultural biotechnologies—but what is unprecedented is the breadth and level of interconnection between these features. Expropriationism thus indicates a new form of capital accumulation that is bound up with the seed, but actually transcends it, as capital is extracted not just through the seed, but through new systems of power and control associated with its purchase and use.

Given that the purpose of these mechanisms is to facilitate private capital accumulation, "expropriationism"

used here differs from the conventional legal and Marxist usage of expropriation conducted by a public body ostensibly for public good. The expropriation occurring here is not for public benefit—arguments regarding the public utility of promoting private accumulation for technological advancement notwithstanding—but is in keeping with the neoliberal trend of accumulation through dispossession (Harvey 2003). To a limited extent, this is based in an ideologically motivated position on public benefit. More conventionally consistent with the above terminology, however, is that if it is not directly employed by a state body, the strategy is certainly state facilitated. In short, the available avenues for capital accumulation are highly dependent on a number of historical and natural conditions, technological developments and state policies. While scientific and technological developments provide new opportunities for capital advancement, the state can act as an essential backer of this innovation, and can facilitate or hinder the diffusion of technological products through regulation and oversight. Thus, regulation is an important mediator of the nature and extent of technology diffusion.

Regulatory oversight associated with agricultural biotechnologies occurs globally—embodied in supranational regulatory agreements such as around intellectual property rights—and locally. Although the "local" actually encompasses a range of regulatory levels including federal, state and even county levels, the only regulations pertinent to the issues discussed here occur at the federal level.[2] The most significant supranational regulatory agreements relevant to agricultural biotechnologies are the Biosafety Protocol of the Convention on Biological Diversity, which entered into force in 2003 (although the Convention entered into force in 1993), and a number of World Trade Organization (WTO) agreements negotiated in the 1986-94 Uruguay Round, such as the Agreement on Sanitary and Phytosanitary Measures and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). While the Protocol is certainly very important politically, and has practical manifestations in regions such as the European Union, the U.S. is not a signatory to it. The country is, however, a member of the WTO and fully subscribes to (indeed was instrumental in the creation of) the WTO's TRIPS agreement. This is quite understandable given the country's high level of investment in the industry and the fact that 75% of publicly traded biotechnology companies are based in the U.S. (ETC Group 2005), including the Monsanto Company, the world's largest seed company. In any case, my concern here is with the ground level neoregulation[3] for the primacy of the market that occurs in conjunction with this agreement.

The WTO's TRIPS agreement aims to establish a minimum standard for intellectual property rights protection amongst its members. With respect to plants, there is little doubt that TRIPS aims to "[extend] the realm of patent law far beyond the common practice of most countries" (Müller 2006:61). In the TRIPS text, intellectual property protection for plants is supported through patenting or through an "effective sui generis system" (WTO 1994, Article 27.3b). There is some ambiguity in exactly what criteria would denote an "effective" alternative system, but subscription to the standards set by the Convention for the International Union for the Protection of Plant Varieties (UPOV) is actively promoted by Northern countries. One of several important differences between intellectual property protection through patenting versus through UPOV is found in UPOV's "farmer's exemption." While a general utility patent on seeds would force farmers to buy new seed for planting each year, the "farmer's exemption" allows farmers to save seeds for their own use, but not for reselling. The 1991 version of UPOV allows for double protection through both plant breeders' rights and patents. The U.S. is a member of this version—which leaves the implementation of the farmer's exemption to national prerogative—and it unequivocally supports patent protection on plants. The loss of farmers' rights to save their own seed is the ultimate social route—in the terminology of Kloppenburg (2004)—to the commodification of the seed. Further, given that seeds are self-reproducing, state support for their patenting creates a conflict of rights between farmers and technology developers when the patented genetic material propagates itself. However, plant patents are only one element in a host of new state-supported production conditions associated with agricultural biotechnologies.

In addition to the strong intellectual property protection essential for the profitable commercialization of the technology, U.S. support for biotechnology is demonstrated in a reluctance to strongly regulate the industry. Under the 1986 *Coordinated Framework for the Regulation of Biotechnology,* U.S. biotechnology regulation was designated to three existing agencies: the Food and Drug Administration, the Environmental Protection Agency, and the U.S. Department of Agriculture. This regulatory approach is based on an overall policy position that the products of biotechnology are "substantially equivalent" to their conventionally produced counterparts. Thus, they can be similarly regulated, as end products, rather than by the process through which they were created. While there are significant concerns with the appropriateness of this approach for such a novel technology—most notably, as contrasted by the regulatory approach of the Euro-

pean Union—the U.S. regulatory approach is rife with failure even according to its own criteria, as evidenced by a number of "incidents": the unapproved for human consumption Starlink Corn contamination disaster in 2000 (resulting in the range of a billion dollars in recalls and lawsuits); improperly contained pharmaceutical crops in 2002; unapproved Bt10 corn contamination in 2005; and, GM rice contamination in 2006 (for more on these incidents see Bratspies 2002, 2003; Mandel 2004; Wright 2005). Even a 2005 audit by the U.S. Department of Agriculture's (USDA) Office of the Inspector General (OIG) characterized the department's regulation as lax and ineffective (USDA OIG 2005).

The retrenchment of public plant breeding is another feature supportive of the accumulation strategies of technology developers. In the U.S., there has been a progressive loss of public plant breeding in conjunction with a reorganization of research for commercial purposes: as a consequence, the public sector has been relegated to basic research, from which the private sector develops commercial applications and brings them to market (for an excellent historical treatment of this topic, see Kloppenburg 2004). Further discussion of these issues extends beyond the scope of this paper and can be found elsewhere (Pechlaner 2007; Pechlaner and Otero 2008).

Overall, state-facilitated support for private capital accumulation in agricultural biotechnologies through strong intellectual property protection, retrenchment of public breeding, and weak regulatory oversight has created a particular institutional context for their introduction. This paper is primarily concerned with the first of these and with related proprietary elements. As a result of state support for these technologies' proprietary aspects, agricultural biotechnologies are in lockstep with a particular mode of delivery that has markedly affected the resulting patterning of agricultural production. This "patterning" arguably amounts to an outright reorganization of agricultural production according to the dictates of private capital. I will now turn to farmers' reactions to these changes.

On the Biotech Farm in Mississippi

Agriculture is very important to the state of Mississippi. Broadly defined—including poultry, forestry, catfish, cattle and row crops—agriculture is the state's number one industry and it provides direct and indirect employment to 30% of Mississippi's workforce (Mississippi Department of Agriculture and Commerce [MDAC] N.d.). What makes Mississippi so favourable to agriculture—its long, hot summer and a short, mild winter—also makes it highly susceptible to weed and insect pressures. Consequently, it provided a favourable context for the introduction of the two main traits of genetic engineering in agriculture: insect resistance (with insecticidal properties engineered into the crop) and herbicide tolerance (allowing for the application of weed-killing herbicide over the top of existing crops). These genetically modified (GM) varieties are available in three of the state's top five agricultural crops, cotton, soybeans and corn, and adoption is near complete. By 2005, 96% of the cotton and 96% of the soybeans grown in Mississippi were genetically engineered (USDA NASS 2005). Similar statistics for corn are not available; however, knowledgeable informants suggest adoption of the technology has been much slower in corn due to problems with yield. The Monsanto Company was the first to offer these technologies in the state. Monsanto's herbicide tolerant system, Roundup Ready (RR), was offered for soybeans in 1996, cotton in 1997 and corn in 1998. The company's insect tolerant system, Bacillus thuringiensis (Bt) was launched for cotton in 1996 and corn in 1997 (Monsanto Company 2005). Stacked varieties (including both Bt and RR) also became available around this time.

The Monsanto Company's early start allowed it to quickly corner the market in GM varieties in Mississippi. In 2004, Bayer CropScience launched an alternative herbicide tolerant system but for a variety of reasons, by 2007, it had reportedly only captured an estimated 3% of the market. At that time, there was as yet no competition with Monsanto's Bt system available. Consequently, in 2005, almost ten years after the introduction of the first GM crops in Mississippi, Monsanto had a virtual monopoly on biotechnologies in the state. This market capture very likely had a significant impact on the way in which the company practiced, and very definitely had an impact on the way in which farmers perceived it to practice. Three main themes can be extracted from the interviews: farmers considered biotechnology applications to be "just another tool" in their agricultural toolkit; the technologies were increasingly considered to be an essential part of their agricultural practice; and, the conditions of their use were restrictive and inequitable, while the technologies' provider, the Monsanto Company, was perceived to be a bully who dictated their every move and penny spent.

By all accounts, farmers who used biotechnologies fully appreciated their physical properties with some differences in impact between the two technological traits. In general, however, these traits were appreciated as management tools that allowed farmers more flexibility with their schedules (for example, when to spray herbicide), reduced the overall time, energy, and labour required for the production of their crops (by reducing trips to the

field for cultivation and spraying), while (in the case of Bt cotton) reducing risk. Although the economic benefit was ambiguous (savings on fuel and labour were countered by the higher cost of the seed and the technology fee), the issue of ease of use and saving time was not. Those who used biotechnologies replied to queries regarding their physical attributes with responses that ranged from "easy" and "wonderful" to "blessing" and "saved the industry." The latter was a response to the introduction of Bt cotton, which was launched just one year after a devastating heliosis (a type of worm) outbreak financially crippled a large number of cotton farmers in the state, some irrecoverably. In this case, the use of Bt technology acted as an insurance policy: you paid a high price for the technology, but secured your investment in your crop in return.

No indication was given in the interviews that Mississippi farmers regarded either technology as a necessary evil they were adopting despite environmental and health concerns, or that biotechnologies produced "frankenfoods," as is often heard in media debates. Rather, these were considered to be perspectives coming from outside of Mississippi agriculture. This is not to imply that no one noted drawbacks. Indeed there were some—specifically, weed and insect resistance and herbicide drift—but the prevailing attitude expressed in interviews within the agricultural community was that biotechnologies provided "just another tool" comparable to conventional agriculture. As one GM farmer described it: "I don't see it as any different of a tool of conventional crop breeding or inorganic fertilizers that came on in the probably early 20th century. Or moving from a mule to a tractor ... You have to continue to evolve. That's just part of it" (#3). A rare environmentalist in the state, who worked in media but was also a small organic producer, similarly characterized the perceived normality of GMOs as an agricultural tool: "I have not come across anybody who is willing to use conventional chemicals and not use GMOs" (#23).

For those interviewed, therefore, biotechnologies appear to occupy a fairly straightforward position on a historical chain of technological improvements. A very important note regarding this position, however, is that while biotechnologies provide "just another tool," these tools are increasingly seen to be essential in Mississippi. Therefore the farmer above, in continuing his thoughts on the technologies' role in a long chain of technological improvements, further reflected, "in Mississippi it's just a fact of life and it's just something we accept, and say it's just something we need and have got to have to stay in business" (#3, GM Producer). That is to say, agricultural biotechnologies are a tool of agro-industrialization, and the technological treadmill this implies is no impediment to their being frankly considered a necessity for survival. I will return to this point presently.

In short, agricultural biotechnologies have been highly successfully integrated into agricultural production practices in Mississippi. Few that I spoke to offered any significant critiques of the technologies until the topic shifted to their proprietary framework and conditions of use, at which time the critiques were voluminous and invariably related to the issue of control. Costs, seed saving restrictions, technology agreements, changing production and reward rules, monopoly control—intertwined in the perception of a shifting fabric of control over agricultural production.

Cost was the number one concern raised regarding the technologies' drawbacks, often in quite emotional terms: "They are scaring us" (#24, GM Producer). Prices had just taken a major jump for both GM seed and the technology fee in the 2005 season. According to Monsanto, their pricing was based "on sharing the profit potential delivered to growers ... versus the cost and benefit of the alternative products that they might otherwise use." In their evaluation, they were "offering more value to the grower than what the pricing reflected" (#41, Monsanto Co.). As will be discussed, the high cost of the technology is not something farmers can easily avoid in favour of these "alternatives." Further, while the vast number of respondents felt that the cost was far out of line with what it used to be and what it ought to be, even those few who were more moderate in their views expressed significant concerns over its future direction. While soybean farmers could technically save a portion of their crop for reseeding the following year (for different reasons, this is not significant to corn or cotton) and still pay Monsanto a technology license, rules against seed saving nonetheless legally obligated them to repurchase seed every year. This precluded a significant cost saving strategy in light of what many felt were wildly rising seed prices in a monopoly market: by 2005, GM soybean seeds worth only $6 on the commodity markets cost producers $30 to purchase as an input, and the cost of GM cotton reportedly "doubled." The retrenchment of public breeding programs further disadvantaged farmers: first, they lost a valuable source of good quality conventional seed; and second, this seed had acted as a check on the demands of private seed dealers who now had no such controls. As one farmer described this difference in the context of the 2005 seed price increases:

> It used to be that the state of Mississippi, Stoneville experimental station or whatever, they had germplasm and they came out with varieties, along with the ... companies. And that tended to keep [them] from going, you know, nuts. But that's not true anymore. [#34]

While the 2005 cost increases were without a doubt dramatic, calculations of the actual cost for a farmer depend on a variety of constantly changing factors. For example, the technology agreement originally required farmers to use Monsanto's herbicide Roundup, instead of an inexpensive generic version. When this strategy became legally untenable, Monsanto lowered the price of its herbicide and increased the cost of its technology fee. It goes to the heart of the control issue that these shifting factors act as economic dictates of a farmer's production practices. The latter occurs at the juncture where cost intersects with a range of agreements, rules and reward programs. In another example, in 2005, the technology fee for cotton was shifted from a per acre pricing to a per seed charge. This change shifted the bulk of the cost of GM farming onto the cottonseed itself, with associated production changes as seed that used to be one of the cheapest inputs became something to regulate and minimize. This had a very specific impact on farmers' production practices:

> You go back, it was really cheap. The seed was the cheapest thing. You could just plant a whole lot of seed ... But now you want to know exactly how many seeds. You plant exactly the same. I was planting 2 seeds every 8 inches. [#6, GM Producer]

While the shifting locus of the cost itself instigated production changes, Monsanto's incentive programs further restricted farmers' range of viable choices. As explained by an agricultural expert on cotton, Monsanto's pricing is based on a certain projected seeding rate, which is actually below that recommended by the agricultural extension agency. To plant a higher rate is exorbitantly expensive without joining the company's reward program, which places a cap on the cost in exchange for customer loyalty to its herbicide. The incentive to use Monsanto's herbicide is therefore considerable.

Replant protection is another motivator for using Monsanto's herbicides. As with a commitment to use Roundup, farmers who experience a planting failure are provided with a rebate on repurchasing seed. Given the cost difference between generic herbicide and Roundup, this still was an insufficient motivation for some farmers. But with changes in the pricing structure of seed to include the technology fee (instead of charging the technology fee by the acre), this motivation was greatly increased. While replant guarantees vary, some seed compensation is typically provided. When the technology fee was charged on a per acre basis, farmers only paid this once. With the shift of the technology fee onto the seed, however, in the event a farmer had to repurchase 50 percent of his seed anew, he would ultimately pay 1.5 times the technology fee. An agricultural consultant explained to me why he thought the company had made the change with an increasingly familiar "because they can" shrug at Monsanto's profit motives: "They have it, they control it, so why not" (#7).

Changes such as these indicate a shifting locus of production control: Monsanto's agreements, rules and incentive programs increasingly dictated aspects of production that had previously been under a farmer's prerogative. Those I interviewed further expressed a keen awareness that farmers were dependent on a very limited source for the technologies, and that this created a huge power imbalance with Monsanto, one that most felt the company was exploiting to the fullest: "Maximum inventory control. They got it, lock stock and barrel ... I'm just telling you how people feel. They feel it's been rammed down their throats, and they don't have anything to say about it" (#20, Soy expert). In short, Monsanto's monopoly control as a GM supplier was frequently characterized as wholly detrimental to farmers' autonomy. At the same time, the opinion that the technologies were essential acted to curtail rejection, no matter how reprehensible the company or its conditions of sale. As one producer of GM crops described it: "Oh [farmers] don't like the company. I think if you polled people in this area it would probably be 100 percent. Monsanto is not a loved company. But they all use it; they have to" (#6).

As agricultural biotechnologies represent the perceived best practices of the up-to-date Mississippi farmer, many felt that to refuse the technology was to risk obsolescence. As further articulated by the farmer above: "Those who didn't go with the technology, it passed them by and they're out. They couldn't compete" (#6). As a consequence, within ten short years of its adoption, it is not unusual to hear statements such as: "We can't grow cotton without the Bt" (#4, GM Producer). Given the level of technological dependence, the challenge to producer control that has been ushered in with agricultural biotechnologies is significant.

The evidence above suggests that important changes are occurring in agriculture that allow for capital accumulation strategies that cannot adequately be explained by the concepts of appropriationism and substitutionism. Farmers are increasingly frustrated by concerns far

greater than strict calculations of profit, but that arise from the various strands of technology agreements, patents, incentive agreements and other legal mechanisms that have woven together to cohesively shift the basis of control over production from them to Monsanto. As a consequence, the evidence appears quite strongly in support of the conceptual addition of "expropriationism" in order to account for the web of new capital accumulation strategies. While there is certainly some overlap between these concepts, particularly between appropriationism and expropriationism—for example, replacing farm-saved seed with purchased GM technology is another form of appropriationism—there is sufficient distinction in the breadth and depth of legal mechanisms that are acting to facilitate this new accumulation strategy that these changes cannot be incorporated under appropriationism. There is no doubt that reorganization is occurring in agricultural production since the introduction of biotechnologies, and that this reorganization entails a progressive expropriation of farmers' control over their production process. Agricultural biotechnologies' proprietary aspects appear to have set a clear trajectory. Whether this will ultimately render farmers as contract labourers or glorified sharecroppers remains to be seen, although it is increasingly in the realm of the imaginable for some:

> We could end up in a society—the pork industry has already gone there, the chicken industry has already gone there, they tried to take the fish industry there—we could end up working for somebody else. Instead of being little independent producers out here, we end up working for the Tyson's chicken company. We can't compete anymore because they control everything. [#29, Consultant/Producer]

Resisting Expropriationism

Given the apparently high level of objection to the production conditions associated with GM technology, it seems reasonable to expect farmers might engage in some tactics or strategies to change these conditions. Such actions—which I broadly characterize as "resistance"—could include refusing to use Monsanto's herbicide, writing letters, lobbying, and litigation, to name a few. Despite the overwhelming sentiments of frustration and resentment expressed by farmers, however, there were few concrete suggestions on what should or could be done regarding the imbalance of power they were experiencing. Competition was frequently suggested as a catchall solution, with little clarity as to expectations of success. Ironically, with the wind and the wide open spaces of the Mississippi delta the potential for a farmer's herbicide application to "drift" onto another farmer's crop is high, thus creating a significant risk of crop damage for farmers in this region who might wish to switch to a variety tolerant to a herbicide other than Roundup. In this case, the rapid success of the technology itself poses a barrier to competition. Actual strategies of resistance appear to be limited to reverting to conventional seeds, using generic herbicide and saving seed illicitly. Rather than solely an economic tactic (though it is for some), this last can also be a deliberate strategy for challenging the rules of the technology as will be discussed below.

As the statistics have indicated, those who chose not to use biotechnologies in Mississippi were very few in number. In the face of the 2005 seed price increases, however, many farmers were upset enough to consider reverting back to conventional seeds. A rare conventional cotton farmer, for example, explained how, in the face of the 2005 price increases, a friend of his opted to try conventional cotton for the first time in years: "they were highly upset about the tech fee increases, and so more or less as their way of rebelling against that, they chose to go back to conventional" (#12).

The availability of conventional seeds was a point of contention, however, contrasting those who pointed to their listing in catalogues against those who dispute their equivalent yield and quality and their dubious quantity (thus being technically available, but not practically viable). The quantity question became far less ambiguous after the 2005 price increases. An expert in soy stated that he had a lot of problems with farmers complaining that they could not get conventional seeds: "We had growers who wanted to grow conventional and couldn't get them, couldn't get the seed. And they had a hard time understanding that" (#20). While this effectively shut down a return to conventional seeds as a means of resistance, it is in part the nature of the supply delay of seed stock production (a one year delay) in the face of an abrupt change in demand. In this sense, farmers really had no choice but to "take it."

It is clearly not just the availability of conventional seeds that prevents farmers from making the transition back to conventional varieties. For example, more than one interviewee told me that while farmers will say they refuse to spend $30 per bag on soybeans, they would ultimately do it anyway because of the relative hardship of reverting to conventional production. This is an important point given the vociferous objection to Monsanto in the context of the virtual lack of concerted resistance efforts, outside of the 2005 attempts to revert to conventional varieties. It seems fair to extrapolate from farmers' level of commitment to the technologies, and from

the sprinkling of comments with the sentiment of "not rocking the boat," that producers are hesitant to mount a strategic resistance to reform the conditions of the technologies' diffusion because they fear they could simply be withdrawn. In fact, an attempt by a number of attorneys from Atlanta, Georgia to initiate a class action lawsuit to recoup a portion of Monsanto's technology fees on soybeans appears to have run dry in Mississippi due to this very fear of "not having the availability of the technology" (#31, GM Producer). As the peceding producer put it, "I knew going in what I was doing, and I knew what I was going to pay, and I paid it, and I'm not willing to take a chance and lose something that's good." It would appear that changing the conditions of the technologies' use in this way is tantamount to unionizing a Wal-Mart: there is always a risk that the corporate response might be to shut down its facility, or, in this case, to withdraw the technology from the market.

A less orchestrated form of resistance is through individual acts of illegal seed saving. For obvious reasons, establishing the degree to which this occurs is difficult, although there is reason to believe it was more prevalent when the technologies were first introduced. The only indications are those that can be extrapolated from Monsanto's attempts to eradicate the problem. In 2007, the Centre for Food Safety (CFS) published an update of its 2005 report on the Monsanto Company's legal actions against farmers (CFS 2005). According to the update, by October 2007, the Monsanto Company had filed 112 lawsuits in 27 different states over technology agreement violations or violations of its patent through acts such as seed saving. These suits involved 372 farmers and 49 small farm businesses (CFS 2007). As noted in the update, however, the lawsuits themselves do not adequately represent the number of farmers who have interacted with the company with respect to seed piracy matters, as pre-court settlements require farmers to sign a non-disclosure agreement. Based on the company's own reporting of its range of seed piracy activities engaged in by 2006, the Centre for Food Safety calculated the company to have engaged in from 2,391 to 4,531 such matters (CFS 2007).

There is anecdotal evidence that when biotechnologies were first introduced, resistance to the patenting of seed and the prohibition on seed saving was high, and that this resistance was very practically manifested in ignoring the restriction. Monsanto's response to non-compliance has been quick and sharp, however. Further, there are many who believe that Monsanto "just picked a few" (#37, Litigant) to prosecute as examples for the others. In any case, once selected, Monsanto appears to have spared no effort or expense in their legal actions, from purchasing an empty lot for surveillance across from one defendant's business,[4] to employing a bevy of lawyers to prosecute the resulting cases. Judgements against those who were prosecuted were also significant: by 2007, the 57 recorded judgements against farmers ranged from over $5,000 to over $3 million, with an average judgement of just under $400,000 (CFS 2007). These judgements are far below the actual cost of the entire legal proceeding to the farmer.

Given the high cost of litigation and the imbalance of power and resources available to those involved in such litigation, the vast majority of farmers appear to settle in the face of such high stakes litigation. For a limited few, however, this imbalance of power only fuels greater resistance. Tennessee cotton farmer, Kem Ralph, for example, became famous for being the first person to go to jail over genetically engineered seed when he burned the disputed seed in contravention of a judge's orders. Ralph's perspective was unequivocal: "Even though I been in prison, I don't care. I feel honoured because I'm fighting these people" (#38). Out of the ten cases filed in Mississippi, two—*Monsanto Co. v. McFarling* (hereafter "*McFarling*") and *Monsanto Co. v. Scruggs* (hereafter "*Scruggs*")—stand out for their direct challenge to the system. At the time of research, both these cases were ongoing. While it is beyond the scope of this paper to go into great depth on these cases (for more, see Pechlaner 2007), a few points do need to be made.

According to Mississippi farmer Homan McFarling, seed saving has been a longstanding practice in his family: "we've always saved seed and replanted it.... My dad saved them before that, and his dad saved them before that." (#16). He claims that when he bought some of Monsanto's new seeds, in 1997, he was not aware that he was not supposed to save them. Rather, he was busy with planting time and never read the technology agreement when it was presented. "They said I had to sign it to get the seed, so I just signed it" (#16). As early as 1998, Monsanto approached McFarling with a settlement offer of $130,000 for his alleged infringement of their patent. McFarling claims he rejected Monsanto's two settlement offers because he could not afford them and because he did not think he had done anything wrong: "I told them right then, no, I don't got that kind of money. And I didn't want to settle with them, I didn't think I'd done nothing wrong. You know, planting and saving seed, what did I do?"(#16). When asked whether he would have settled if they asked for a lower amount, he remained consistent, "No, I don't think so. I ain't never thought about settling." His reasoning is straightforward, "I don't feel like I've done nothing wrong" (#16).

If McFarling indeed started from a place of lack of awareness of the new rules, he soon became a stubborn

defender of the rights of farmers to save their seed. In the course of his long legal proceedings—initiated in 2000—McFarling did not back down from his position that he had "done nothing wrong." Despite the severity of his legal troubles, McFarling nonetheless indicated to the court that "unless enjoined, he intended to plant soybeans saved from the 2000 harvest in 2001."[5] Monsanto applied for—and was granted—a preliminary injunction preventing him from doing so. Nonetheless, in practice, McFarling clearly resisted the expropriationist tendencies of the new biotech regime. Having refused to settle, McFarling moved the issue from one that might be characterized as "training the locals"—that is, training Mississippi farmers to comply with the new intellectual property rules that accompany GM seeds—to one that directly challenged the legitimacy of the new rules.

McFarling's course of litigation provided a defence to the charge of infringement through counterclaims against Monsanto's means of disseminating the technology and included claims of violation of the Plant Variety Protection Act (legislation permitting seed saving), monopolization, unreasonable restraint of trade, and violation of Mississippi antitrust law and patent misuse. In this way, McFarling forced a wealth of complex issues to be considered by the court. These ranged from the extremely abstract (whether the patent covered both trait and germplasm or only trait, and whether the patent was "exhausted" in the second generation) to the very concrete (the legality of the damages clause), and drew in the whole agrobiotechnology delivery structure to question whether the new system of rules was unfairly biased against farmers.

Despite three appeals, McFarling failed overall with respect to patent misuse, antitrust and related claims. He did, however, have a partial success during his challenge of two terms of the technology agreement: the "forum selection" clause, which designated the jurisdiction of dispute settlement, and the "120-multiplier" clause, regarding damages. In the former, any farmer in dispute with Monsanto must travel to Missouri, greatly increasing the expense and impact of any such litigation. While this clause was ultimately upheld, Circuit Judge Clevenger filed a strongly worded dissent on the basis that the Technology Agreement as a whole represented a "contract of adhesion," that is, a contract between parties of unequal power with take-it-or-leave-it provisions and with no other source for the necessary goods. Clevenger argued that "farmers sign the Technology Agreement if they wish to remain competitive in the soybean market,"[6] and consequently, supporting the provisions of such an adhesion contract against a defendant was "in derogation of his constitutional rights."[7]

The 120-multiplier clause required an accounting of actual damages and then multiplied it by 120, a calculation that would seemingly bankrupt any infringing farmer. In a rare victory, this clause was determined to constitute punitive damages, which are unenforceable under Missouri law, and was struck down. The removal of this clause reduced a significant threat against farmers facing litigation with the company. According to a paralegal involved with a number of the cases, "a lot of the farmers have settled with Monsanto because of the 120 multiplier ... Nobody could pay it" (#18). Nonetheless, despite the striking down of the 120 multiplier, the damages ultimately awarded were still significant. The district court awarded Monsanto approximately $375,000 in damages, which at $40 per bag fell between the established royalty of $6.50 per bag that McFarling argued would be appropriate and the $73.20 to $80.65 per bag proposed by Monsanto.[8] McFarling appealed the damages, but they were affirmed in May 2007. A subsequent petition by McFarling to the U.S. Supreme Court was denied on 7 January 2008.

While McFarling was not successful in the majority of his challenges, in many ways he set the stage for the Scruggs case and the evidence and lines of argument appeared to gain in strength. *Scruggs* also had a greater potential to take many of the issues raised in *McFarling* further, given the Scruggs' superior resources: the Scruggs brothers are reportedly the largest farmers in three counties, and had 20,000 acres under production, a farm supply business, and a cotton ginning facility. Mitchell Scruggs himself had an estimated net worth of $5 to $8 million dollars.[9] As a point of comparison, McFarling did not even have a patent lawyer on his case.

As in *McFarling*, the factual evidence of infringement was straightforward. The Scruggs admitted to purchasing and resaving Monsanto's seed and to not signing a technology licence. While they vehemently denied selling saved seed through their farm supply store, they readily admitted to not requiring farmers to sign the technology agreement. Monsanto did not make the Scruggs a settlement offer. This is perhaps not surprising given that Mitchell Scruggs demonstrated every intent to reclaim a farmer's right to farm saved seed. Pointedly, he did not require his own customers to sign Monsanto's technology agreement on the basis of principle: "It was no law or anything said that I had to force a farmer to sign a contract that I didn't believe in myself. I mean Monsanto just wanted the farmers to sign it so they would have some kind of strong arm on them" (#15).

Scruggs' battle with Monsanto eventually cost him his seed dealership, as he was no longer allowed any con-

tact with the company's technology. By 2005 he had opened a new store, Scruggs Farm Lawn & Garden Home Improvement Warehouse. At that time, he still cast his legal issues in the context of the broader concerns of farmers in the face of the changing rules associated with agricultural biotechnologies:

> I don't think it's fair, then or today or anytime, for one company to use any type of technology to monopolize the whole seed industry and control the food and fibre of the world. That wasn't what patents were intended to do. [#15]

There is little doubt that Mitchell Scruggs saw himself as playing a defensive role in resisting those changes.

Notwithstanding some of the unique elements in *Scruggs*, similar to *McFarling*, we see a defence that is heavily steeped in the propriety of Monsanto's prohibitions on seed saving, raising such issues as patent exhaustion (over successive generations of seed), patent misuse or antitrust (such as through tying the trait to the germplasm and the herbicide to the trait), antitrust violations, and violation of the Plant Variety Protection Act. Essentially, they are challenges launched at the market disadvantage for farmers created through contracts and other means, and which have already been noted in farmers' complaints about the company. Despite many strong arguments, the Scruggs' claims were nonetheless thwarted at almost every stage. The District Court found insufficient grounds to proceed to trial and granted Monsanto's motion for Summary Judgment, while denying that of the Scruggs. On appeal, the Scruggs again launched strong allegations about Monsanto's controlling practices, alleging that it:

> misused its patents to impermissibly exclude competitors in trait and herbicide markets, create and police a seed cartel, raise prices, tie/bundle/leverage separate products, fix pricing components, mandate economic waste, harm competition, restrain trade and extract monopoly profits."[10]

By 2005 the Scruggs had not yet succeeded in any significant aspects of their claims, but they had succeeded in providing a large amount of evidence to put such issues into question. Subsequently, the Attorney General of Mississippi submitted a brief in support of proceeding to trial, arguing that the Scruggs presented sufficient evidence of Monsanto's market power and "well documented allegations of disturbing exercises of such power."[11] While a number of the Attorney General's stated concerns echoed arguments regarding farmers' "choice" in the context of the "indispensable nature" of the Roundup Ready trait, his main concern was that these power issues not avoid being put to trial:

> Monsanto's inefficient and costly no-replant policy imposed on Mississippi and other American farmers has continually evaded judicial scrutiny on its merits—or potential lack thereof—as to whether it violates federal antitrust laws. The time is now ripe for such an inquiry.[12]

Despite such support, and significant efforts to bring the issues to trial, the Scruggs have failed in their numerous attempts to make legal headway. The Summary Judgment decision was affirmed in August 2006. In December, the Scruggs applied for rehearing but the application was denied. They subsequently applied for hearing by the Supreme Court but this request was also denied on 16 April 2007. In 2009, the Scruggs petitioned the court to reconsider its 2004 denial of their motion for Summary Judgment in light of a subsequent court decision material to the issue of patent exhaustion. While the application was denied, the Court recognized that the issue involved a controlling question of law, and left an opening for appeal. On 4 May 2009, the U.S. Court of Appeals denied permission to appeal but noted that "Scruggs may raise these issues on appeal from the final judgment or injunction."[13]

While the long battle of *Scruggs* may still find new ground, to date, Monsanto has prevailed in reorganizing systems of power and control in conjunction with the introduction of agricultural biotechnologies in ways that provide new mechanisms for capital accumulation. As characterized by a Monsanto representative, the rulings in these two cases, "reinforce both the legality and the appropriateness of Monsanto's business model" (#41). Nonetheless, in both *McFarling* and *Scruggs* it is clear that at the very least, the transition to the new expropriationist paradigm is not occurring without challenge. While neither case has made significant inroads into changing the power dynamics associated with the adoption of agricultural biotechnologies, both cases have forced a number of these dynamics into the light for further scrutiny. Whether this exposure will help ultimately to prompt a change in these dynamics remains to be seen.

Conclusion

As we can see here, however one views them, the introduction of agricultural biotechnologies has been an important event for Mississippi agriculture. Biotechnologies are far from passive, however, simply offering their physical properties for farmers to take up like a shiny new hammer. In addition to their physical properties, biotechnologies

have been associated with important neoregulatory institutional changes such as enhanced intellectual property rights, weak regulation and a retrenchment of public plant breeding. It is a tribute to the complex social character of the technologies that farmers do not perceive them as either wholly good or bad, but as multifaceted, and playing many roles in the network of agricultural production in Mississippi. Along the different points of this network you can hear polarized statements about their worth—from being the "salvation" of Mississippi cotton to being the means to "controlling the food and fibre of the world"—that are nonetheless not necessarily contradictory. That said, it is clear here that the proprietary aspects of biotechnologies have been hugely significant in reorganizing agricultural production in Mississippi, so much so that I argue that the important explanatory concepts of appropriationism and substitutionism need to be joined by a third, "expropriationism," in order to account for new capital accumulation strategies based on them.

Despite some important physical drawbacks to the technology (notably, drift and increasing resistance), it is nonetheless a tribute to the technologies' desirability that farmers in Mississippi are so hugely drawn to their use despite their objections to Monsanto and to the restrictive conditions attached to the technologies' purchase and use. In response to what amounts to a profound and progressive narrowing of options, farmers have been vociferous but subdued: vociferous in denouncing what can generally be characterized as a loss of control, but subdued in strategic actions to address it. There seems little doubt that the high level of technological dependence has drastically curtailed any potential resistance to the production conditions set by Monsanto. For the most part, Mississippi farmers are shrinking their range of mobility without much of a fight—outside of the very few who have reverted to conventional seeds—largely because they find the technologies' physical benefits outweigh their costs at the present time. It remains an open question whether significant change will be possible in the plausible event that this balance shifts. The judicial and regulatory bodies of the U.S., for their part, appear almost uniformly supportive of the institutionalization of private sector accumulation strategies that ultimately diminish farmers' alternatives and limit their range of action.

While strategic action in response to the shifting balance of power between farmers and technology developers seems very limited in the Mississippi farming community, it is, however, practiced outside it by environmental and other NGOs, such as the Centre for Food Safety. Further, for a very limited few, the legal forum has become the site of a more strategic contestation of the conditions of the technologies' use. While not necessarily deliberate in their legal engagement with the company (though perhaps it was deliberate for some), once engaged it is clear that a number of farmers have cast themselves in a larger role than self-preservation. Therefore, while resistance for the majority of farmer appears limited to tactical responses, such as using generic chemicals, a few have engaged in direct resistance in the legal forum. As we have seen in *McFarling* and *Scruggs*, however, the impact of this resistance has been limited to date, and the expropriationist trajectory of the unfolding regime appears undaunted. Nonetheless, the issues are gaining exposure in the broader farming community, as can be seen by the involvement of the Solicitor General of the U.S. in *McFarling* and the Attorney General for the State of Mississippi in *Scruggs*, and this could ultimately create reform pressures.

Much has happened in agriculture since the interviews were conducted in 2005. Most significantly, subsequent years have seen a "perfect storm" of pressures on agricultural commodities—for example, drought in Australia, population growth, rising incomes in developing countries—that have caused both an agricultural boom and a global food crisis. In addition, rising energy costs have prompted a policy of agrofuel development in a number of countries, which has made a highly debated but significant contribution to the upward pressure on the value of agricultural commodities. While prices have subsided, in large part, due to the subsequent global financial crisis, tighter credit may actually curtail production and prompt a resurgence of the boom (Blas 2008, 2009). Moreover, in the long term, many of the factors prompting the increase in prices remain, although much will depend on the tenuous fate of the agrofuel industry. Such factors will likely be important to the configuring of the new regime in developed countries. As high prices increase the profitability of farming, restrictions on seed saving and related measures will only marginally impact profits, and consequently will garner less resistance from farmers. Pfeffer (1992), for example, argues that good economic times support a presumption of a mutually beneficial relationship between agribusiness and farmers, which breaks down when times are hard. Relatedly, how agricultural biotechnologies are positioned to respond to global climate and other environmental changes will also influence farmers' level of acceptance of the conditions under which they are released. These are important factors for future research on this topic.

Finally, my own research suggests that while there are a number of strong parallels between the experience of farmers with agricultural biotechnologies in Saskatch-

ewan, Canada, and that of farmers in Mississippi, there are also a sufficient number of differences that suggest that the unfolding of capital accumulation strategies needs further research to strengthen conclusions about its trajectory, and about the avenues for, and successes of, resistance to this trajectory. This research, in conjunction with related research in regions where the technologies' adoption has been thwarted (such as in a number of countries of the European Union), would be another important addition to our understanding of these processes.

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Notes

1 For further discussion of some of these issues, see Pechlaner 2007.

2 A number of very interesting state and county level regulatory battles have occurred over agricultural biotechnologies—for example, over the potential for regional GM bans—however this article is directly concerned with the experience of farmers in Mississippi where such battles have not occurred.

3 Neoregulation and reregulation both strive to overcome the conceptual defects of the term "deregulation," which implies a retrenchment of the state and fails to capture its active participation in establishing the primacy of the market. I and my co-author (Pechlaner and Otero 2010) opt for the term neoregulation as more appropriate to characterize the current aspects of regulation which require the active participation of the state but are distinct from a reapplication of earlier welfare state style regulation.

4 *Monsanto Co. v. Scruggs*, 342 F. Supp. 2d. 602. (N.D. Miss 2004) at 606. (United States district Court for the Northern District of Mississippi, Western Division, 2 July 2004:4)

5 *Monsanto Co. v. McFarling*, 302 F. 3d 1291 (Fed. Cir. 2002) at 1294.

6 *Monsanto Co. v. McFarling*, 302 F. 3d 1291 (Fed. Cir. 2002) at 1301.

7 *Monsanto Co. v. Scruggs*, 342 F. Supp. 2d. 602. (N.D. Miss 2004) at 1306.

8 Monsanto Co. v. McFarling, 488 F. 3d 973 (Fed. Cir. 2007) at 977.

9 *Monsanto Co. v. Scruggs*, 249 F. Supp. 2d. 746 (N.D. Miss. 2001) at 760.

10 *Monsanto Co. v. Scruggs*, 459 F. 3d. 1328 (Fed. Cir. 2006) (Brief of Appellants, 2 May 2005: 8).

11 *Monsanto Co. v. Scruggs*, 459 F. 3d. 1328 (Fed. Cir. 2006) (Brief of Amicus Curiae, Jim Hood, Attorney General State of Mississippi, 20 May 2005:20).

12 *Monsanto Co. v. Scruggs*, 459 F. 3d. 1328 (Fed. Cir. 2006) (Brief of Amicus Curiae, Jim Hood, Attorney General State of Mississippi, 20 May 2005:16).

13 *Monsanto Co. v. McFarling*, No. 900, 2009, Lexis 11700 (Fed. Cir. 4 May 2009) at 5.

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