



The BAYER-MONSANTO merger: Implications for South Africa's agricultural future and its smallholder farmers

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CONTENTS

ABBREVIATIONS AND ACRONYMS	3
ABOUT THIS PAPER	4
KEY FINDINGS	4
INTRODUCTION	6
SEED AND AGROCHEMICAL MARKETS	7
The global and regional seed market	7
The South African seed market	8
The global and regional agrochemical market	9
The South African agrochemical market	9
Bayer and Monsanto in South Africa	9
Bayer Crop Science in South Africa	9
Monsanto in South Africa	10
DRIVERS OF CONSOLIDATION IN THE AGRICULTURAL INPUT INDUSTRY	12
Financial drivers	12
The need to own germplasm and traits to remain competitive	12
Control of the big data market	13
The need to find new markets	14
CONTESTING THE MERGER	14
A note on efficiency gains	15
Reducing competition in the seed and agrochemical markets	16
Decreasing innovation	17
Further entrenchment of intellectual property rights regimes	19
Public benefit aspects and implications for farmers	20
The prices of agricultural inputs could increase	20
The choice of available inputs could decrease	21
A genetically modified future for Africa's staple food crops?	22
The implications for food security	22
Concerns around governance of the seed and agrochemical sectors	24
CONCLUSION	24
REFERENCES	26



On 7 April 2015 the African Centre for Biosafety officially changed its name to the African Centre for Biodiversity (ACB). This name change was agreed to by consultation within the ACB, to reflect the expanded scope of our work over the past few years. All ACB publications prior to this date will remain under our old name of African Centre for Biosafety and should continue to be referenced as such.

We remain committed to dismantling inequalities in the food and agriculture systems in Africa and to our belief in peoples' rights to healthy and culturally appropriate food, produced through ecologically sound and sustainable methods, and to define their own food and agriculture systems.

The Rosa Luxemburg Stiftung (RLS) is a German political foundation that promotes democratic socialism worldwide. It is a non-profit organisation and is affiliated to, but independent from the German Left Party. The foundation has been active in Southern Africa since 2002 and its focus on political education involves creating platforms for civic participation, critical thinking, research and dialogue in the quest for participatory, inclusive and peaceful democracy.

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ABBREVIATIONS AND ACRONYMS

ACB	African Centre for Biodiversity
CCSA	Competition Commission South Africa
COMESA	Common Market for East and Southern Africa
CRISPR	Clustered Regularly Interspersed Short Palindromic Repeats
ETC	Action Group on Erosion, Technology and Concentration
GM	Genetically modified
NAMC	National Agricultural Marketing Council of South Africa
RLS	Rosa Luxemburg Stiftung
SANSOR	South African National Seed Organization
TASAI	The African Seed Access Index
WEMA	Water Efficient Maize for Africa

ABOUT THIS PAPER

This paper explores the likely implications of an approved Bayer-Monsanto merger for the South African agricultural system. It outlines the trend of consolidation occurring within the seed and agrochemical industries, provides a background to the merger, criticises the rationale given for the merger by Bayer and Monsanto and outlines concerns should the merger be approved in South Africa. These concerns focus on the implications for South African farmers, smallholder farmers in particular. The paper argues that further consolidation of an already corporate-controlled seed sector is not needed and that it undermines the emergence of an alternative system that would support smallholder farmers in contributing to food security in an egalitarian agricultural economy.

KEY FINDINGS

Context

- The proposed Bayer-Monsanto merger takes place in a context of megamergers: China National Chemical Corporation (ChemChina)-Syngenta; DuPont-Dow. If approved, just three corporations would control about 60% of the global patented seed market and 64% of the agrochemical market.
- If the Bayer-Monsanto merger is approved, the new merged company will control almost 30% of the global commercial seed market and 25% of the agrochemical market – making it the world’s largest supplier of seeds and chemicals. In South Africa, it would control about 30% of both markets. Already today, Monsanto is one of two companies in South Africa that employs 80% of the private sector breeders in maize and 100% of the breeders in soybean and sunflower breeders.
- The merger will need to be approved by regulatory authorities in more than 30 countries. Authorities are viewing the merger activities in totality to assess possible implications for the market, farmers and consumers. They will look at whether reduced competition will lead to reduced innovation, lowered spending on research and development and implications for increased input costs and reduced choice for farmers and other consumers (although the market is already significantly consolidated).
- Merger activity is being driven by the global economic downturn and reduced demand for products by farmers because of low commodity prices. It is also driven by the desire to reduce operational costs, particularly for research and development processes, and to access proprietary knowledge enclosed in intellectual property rights, such as patents. The merger and acquisition trend is supported by the historically low interest rates (close to zero) being offered in the United States, the Euro zone, Japan and the United Kingdom.
- Both Bayer and Monsanto are already engaged in big data projects in the agricultural sector. Bayer notes that one of its prime reasons for acquiring Monsanto is because it owns The Climate Corporation, which has the most powerful data science engine and the most extensive field research network. In addition, Monsanto has its foot in several important Genome Editing initiatives: it owns one of the two existing CRISPR licenses and has started two joint ventures on precision agriculture with the agrotech giants CNH and AGCO.
- Both companies would benefit from sharing patents on genetically modified crops and existing network and distribution models as they both plan to expand into the African market, with a particular focus on smallholder farmers. Bayer has been in the plant genetic engineering arena since the early 2000s and holds more patents on transgenic plant traits (206) than Monsanto (119) in the European Union). Having access to each other’s proprietary knowledge would provide them with significant cost savings, particularly as the biotech industry shifts towards using CRISPR genome editing technology, which revolutionises transgenic interventions through the rewriting of whole DNA-sequences, but is not yet subject to a comparable degree of regulatory oversight as the first generation of genetic engineering. Both traits and germplasm is



– <http://ssg-advisors.com/files/2015/04/P1030544.jpg>

- needed to remain competitive in this market.
- South Africa is the most important African market for both companies in terms of sales and for providing a base for African expansion. The recent request by GrainSA, Agbiz Grain, the South African National Seed Organization (SANSOR) and the Agricultural Research Council for a breeding and technology levy to be imposed on winter cereals in South Africa – with the possibility of expanding this to other crops – would effectively mean that public resources would be used to collect royalty payments for these companies.
- Both Bayer and Monsanto sit on industry representative bodies, giving them a significant degree of influence on the industry – a combined company would enjoy benefits of greater influence.

Implications

The merger between Bayer Crop Science and Monsanto would have possible implications for the agricultural sector and the food system in South Africa:

- It would further reduce the competition within the South African seed sector. Evidence from the US seed market shows that mergers of this size will change key parameters of the seed market. Bayer-Monsanto's dominant market position will be further enhanced, as will both companies' control over traits-germplasm-crop protection products in the country.
- Quite contrary to the claims of Bayer and Monsanto managers, the merger is likely to decrease the amount of investment and the range of innovations. This paper argues that the potential merger must be analysed in the larger context of a rapid privatisation of research and development. A particularly important tool of the potential Bayer-Monsanto seed giant would be the instrument of licensing rights, and increased pressure on farmers through the collection of levies is expected.
- Serious impacts are anticipated for farmers and food consumers alike. For farmers, evidence from the last few years at both the South African seed market and the US seed market shows that a further increase in seed prices is very likely. The choice of available inputs will further decrease. Given the high amount of sunk costs that particularly Monsanto invested in the development of partly unsuccessful genetically modified organisms, there is a threat that the South African market will be used as a strategic point from where to 'dump' old genetically modified (GM) technologies onto the African market. On the other hand, available micro data from households in South Africa show how any price increase in staple food prices might affect the income poor. An indirect effect on food prices from the merger cannot be excluded.
- A closer look at the drivers of the Bayer-Monsanto merger reveals that the 'efficiency argument' put forward by the corporations might lead to a benefit to their shareholders, but cannot be expected to spill over to external groups, such as farmers and food consumers.

INTRODUCTION

The proposed Bayer-Monsanto merger will give control of almost 30% of the world's commercial seed market and almost 25% of the world's commercial pesticide and herbicide (agrochemical) markets to one company (Peries, 2016), effectively making it the world's largest supplier of seeds and agrochemicals (Bunge and Alessi, 2016). In South Africa, the merged company would control more than 30% of the value of the commercial seed and agrochemical markets based on current market share (Mashingaidze, 2016). The merger must gain approval from regulatory bodies in more than 30 countries, including the United States, Canada, the European Union, Brazil, India, China and South Africa. This deal would be the largest-ever foreign corporate takeover by a German company (Bunge and Alessi, 2016). Monsanto shareholders voted in favour of the sale of the company to Bayer on 13 December 2016 at a purchase price of US\$66 billion. Competition authorities around the world may consider the Bayer-Monsanto merger in the context of multiple planned mergers that are in various stages of regulatory approval, including that of Du Pont-Dow and ChemChina-Syngenta in seed and agro-chemicals, and Canadian Potash Corp-Agrium in synthetic fertilisers.

Monsanto and Bayer argue that the deal would allow them to make their operations more efficient through the merging of expertise and knowledge, and that it would allow them to cut costs and remain competitive in consolidating markets (Kaskey and Casey, 2015). From a competition perspective, the merging of expertise can qualify as an efficiency gain, resulting in economies of scale, improved use of available capacity and cost reductions (Röller and de la Mano, 2006). This is often used as an argument to offset potential reduction of competition in the marketplace. Bayer and Monsanto also claim that, once merged, they will be able to offer farmers more and better quality products (Bayer, 2016). According to Bayer's chief executive officer Werner Baumann, the deal is a 'fantastic combination for modern agriculture, to cater to the needs of society by providing the tools needed to feed a rapidly growing population' (Bunge and Alessi, 2016).

The merger is contested on several grounds. Regulatory authorities question whether the shrinking of an already consolidated market will further reduce competition and create or boost a dominant player, thus leaving farmers with fewer and perhaps more expensive product choices. They will also question whether the merger, seen in context with the others, will reduce the motivation to innovate, since the market has effectively been captured. To this we question the public interest rationale given by the companies, which includes positioning themselves to help feed a growing global population, when more than enough food is currently produced to feed the world population. Food security is more an issue of access and affordability than of production shortfalls at a global level (Ziegler, 2002; Tomlinson, 2013).

It seems likely that one result of the merger will be an increased push by these companies to offload genetically modified/edited seeds along with the requisite accompanying crop protection products into an extensive and relatively untapped African market. The threat of increased input costs (to be borne by farmers and, in some cases, through publicly-funded input subsidy systems) is significant in Africa, given the high levels of food insecurity and smallholder farmer poverty. This is especially concerning when there is a strong thrust for farmers to adopt commercial seed and agrochemicals as part of agricultural commercialisation, both in policy and in donor and government practical interventions. The expansion of these seeds, chemicals and associated production methods threatens to undermine pre-existing systems that are adapted to local conditions, even if they are not perfect in themselves. The narrowing of seed options to those provided by globally dominant corporations is problematic in the face of a changing and uncertain climatic future in which resilience can only be built through supporting a diversity of context-appropriate agricultural systems and inputs.

The following sections provide a background to the merger, unpack the arguments against it and consider implications for the South African agricultural system, in particular smallholder farmers. Even in South Africa the

latter are an important component of a shift to a more diverse, context-appropriate agrarian structure that incorporates social justice and equity (through restitution and access to economic assets and resources), and ecological sustainability.

SEED AND AGROCHEMICAL MARKETS

Global agricultural input markets (seed, fertiliser, crop protection products, farm machinery and agri-tech markets) are already significantly consolidated, having experienced a series of horizontal and vertical mergers and acquisitions over the past two decades (Figure 1).

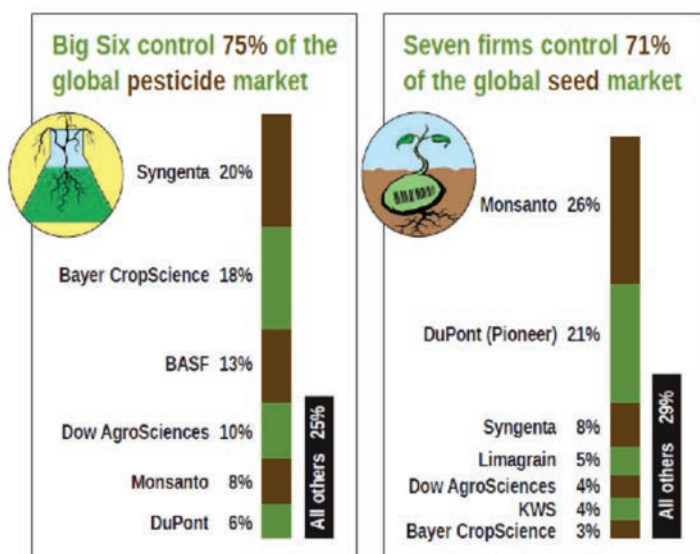
The global and regional seed market

In 1994, the four biggest seed companies controlled 21% of the global market (AgriPortal, 2016); today just ten companies own about 65% of the world's proprietary seed (seed registered for legal protection) for major crops (Wattnem, 2016). It must be noted that in

Africa 65–100% of seed used by smallholder farmers is farmer-saved and exchanged (varies by crop and geography) (Wattnem, 2016). The global commercial seed market has an estimated value of about US\$53 billion and is expected to grow to US\$113 billion by 2020 (Marketsandmarkets, 2016) with the African market contributing less than 2% to the current value (CTA, 2015). This presents a potentially lucrative market, but many obstacles have to be overcome to carry out a sustainably profitable business. Some of the bigger ones include lack of infrastructure, specialised knowledge, institutional arrangements and political bureaucracy.

The genetically modified seed market was worth US\$15.6 billion in 2011 and is expected to grow to US\$30.2 billion in 2018 (AGPRO, 2013). However, a recent market report notes that conventional seeds are expected to be the fastest growing segment of total seed sales (Marketsandmarkets, 2016). Constraints to continued GM expansion globally include prohibitive costs of research, the extended time period to gain regulatory approval (up to seven years), and saturated markets of those countries that have allowed the cultivation of genetically modified crops (such as the United States and Brazil). Of the more than US\$180 million that Monsanto spends on research and

Figure 1: Corporate concentration in global pesticide and seed markets



Source: ETC Group, 2015



https://cdn.mg.co.za/crop/content/images/2015/02/12/seeds_landscape.jpg/633x356/

development each year, less than 2% is spent on genetically modified crops (Monsanto, n.d.[1]). Africa presents an untapped market but with very slow processes of regulatory and institutional development to allow GM crops to be grown. In the meantime, market expansion will be based on conventional certified seed and agrochemicals.

Maize and horticulture are the two biggest seed markets on the African continent, with the maize market valued at about US\$500 million and horticulture at US\$250 million; most seed company activity takes place in this space (ACB, 2015). There is more recent interest in commercialisation of legume seed on the continent.

The South African seed market

South Africa has a dominant commercial seed industry, which is primarily geared to serving the needs of large-scale commercial farmers, with a dominant focus on hybrid, improved and genetically modified seed (DAFF, 2015). South Africa's marginal smallholder farmers also rely on commercial seed as a significant source of planting material, especially for maize and horticulture, although indigenous crops and farmer seed varieties are also used. Multinational corporations dominate the seed industry: Pioneer Hi-Bred/Pannar,

Sakata, Monsanto and Syngenta (GrainSA, 2015). Of these Pannar, Monsanto and Sakata sit on the board of directors of the South African National Seed Organization (SANSOR) (SANSOR, 2015), which represents the industry and is responsible for seed sector governance, including the collection of royalties on behalf of the Agricultural Research Council, and for conducting official seed certification and testing (TASAI, 2015).

The value of the South African seed market was estimated at R5.62 billion in 2012/13 (TASAI, 2015). The focus of both Bayer and Monsanto is on commodity crops: maize, sunflower, soybean, cotton and wheat. The value of the seed market in grain and oilseed was about R3.9 billion (about US\$285 million) for the 2014/15 production season (GrainSA, 2015). Horticulture is a growing share of the agricultural market, contributing about 26% to total agricultural produce in 2012, with the balance taken up by field crops (Barrientos and Visser, 2012). South Africa is the ninth largest producer of genetically modified crops in the world, planting genetically modified maize, cotton and soya on 2.3 million hectares; this is a 25% decrease from 2014 because of the drought (ISAAA, 2015). About 90% of all maize planted is genetically modified, 95% of soybean and 100% of cotton (ISAAA, 2015a). Of

maize planted in 2015, 30.5% had single insect resistant genes, 15.7% had herbicide tolerant genes and 52.2% had stacked insect resistant and herbicide tolerant genes (ISAAA, 2015a).

Maize dominates the national variety list – there are 546 maize varieties on the official list; 308 are protected by plant breeders' rights and 162 are genetically modified (TASAI, 2015). There are 41 genetically modified soybean varieties on the list and 35 non-genetically modified ones, including 19 with plant breeders' rights protection (TASAI, 2015). Monsanto and DuPont/Pioneer Hi-Bred/Pannar own at least 85% of the seed business for the big commodity crops – maize, soybean (the second largest agronomic crop in the country) and sunflower. There is intense competition between them (TASAI, 2015). DuPont is planning to merge with Dow, which puts pressure on Monsanto to increase its scale to continue competing in seed and agrochemical markets. Bayer's strength is in agrochemicals, although it has a small seed footprint in South Africa. Bayer introduced its cotton seed to South Africa in 2014 and a new canola seed variety in 2015 (Breytenbach, 2015). It reportedly introduced these new varieties into South Africa in response to a direct call from farmers asking for alternative products (Breytenbach, 2015).

Syngenta, Monsanto, Pannar-Du Pont Pioneer and Dow form SANSOR's committee on genetically modified organisms (SANSOR, 2016). Any activity that is likely to increase Monsanto's influence in this market in South Africa is significant given the extent of genetically modified maize planted, the country's staple food crop.

The global and regional agrochemical market

The global agrochemical market is estimated to be worth about US\$33.4 billion (Macaskill, 2016) with the African market valued at around US\$1.1 billion (R15–20 billion) in 2014 (Odendaal, 2014). The agrochemical market is dominated by Monsanto (US\$15 billion), Syngenta (US\$13.4 billion), Bayer (US\$10.4 billion), DuPont (US\$9.8 billion), Dow (with sales of US\$6.38 billion in 2015) and BASF (US\$5.8 billion); Chinese-owned ChemChina doesn't make divisional sales figures available,

but total sale figures for all divisions (of which agrochemicals is just one) were US\$45 billion in 2015 (Alessi, 2016).

The South African agrochemical market

South Africa uses more agrochemicals than any other African country, mostly for grain crop production (*PR Newswire*, 2015), yet it comprises less than 2% of the global market (Macaskill, 2016). South African farmers spent R2.3 billion on agrochemicals in the 2014/15 season (GrainSA, 2015). The South African agrochemicals market is estimated to grow at a compound annual growth rate of 4.5% by 2020 (*PR Newswire*, 2015). Major agrochemical companies operating in the country range from Bayer Cropsience and Syngenta to Adama, Dow Agrosiences, Philagro South Africa, BASF South Africa, Sipcam, Monsanto and Chemtura Corporation (GrainSA, 2015). Companies such as Bayer, Syngenta SA, Dow, DuPont and Monsanto South Africa sit on the executive council of CropLife SA, an industry representative body (CropLife SA, 2016).

Bayer and Monsanto in South Africa

Both Bayer and Monsanto are major manufacturers of agrochemicals, seeds and genetically modified seed (Court, 2016). Company confidentiality makes it difficult to ascertain market-specific market shares for any company.

Bayer Crop Science in South Africa

Most of Bayer's African sales are generated in South Africa, and a key part of Bayer's strategic focus for its business in southern Africa is 'expanding our seed footprint – especially for soyabeans and wheat – through further acquisitions, in-licensing agreements and partnerships' (Bayer, 2016). It owns a manufacturing plant in South Africa, has established a maize competency centre in KwaZulu-Natal (Bayer Crop Science, 2016e) and has opened its first African SeedGrowth Centre near Johannesburg (one of 16 in the world) (Bayer, 2016c). The Centre will train seed company production staff, support seed companies in upscaling processes, act as a base for research in optimising seed treatment technologies and demonstrate how Bayer's equipment works (Bayer, 2016c).

It is focusing on both the large-scale commercial and small-scale farming sectors. In March 2016 Bayer launched its 'Committed to the Future Pledge' at the South African Grain Congress, in which it promised to continue to invest more than 10% of turnover into developing new compounds (it should be noted that this is their core business and so does not qualify as an added benefit for South Africa). It also promised to invest in further initiatives, like its Bayer Forward Farms project, a knowledge platform that facilitates the sharing of knowledge between selected farms and the combined expertise of the broader industry (Bayer, 2016d).

It is also actively pursuing the small-scale farming market. Bayer uses demonstration farms and training centres set up by organisations, such as the United States farm machinery giant AGCO to showcase its inputs (Maritz, 2016). It is involved in other projects like this in South Africa, Ghana, Ethiopia and Morocco (Maritz, 2016). It is also engaging in strategic partnerships with the Competitive African Rice Initiative in Burkina Faso, Ghana and Tanzania and with potato projects, which are sponsored by GIZ, Germany's international development agency, in Kenya and Nigeria (Maritz, 2016). Beyond this, Bayer is selling its products in smaller packaging (e.g. a 10ml insecticide for use on cotton), so that they retail for lower prices, in Malawi, Zimbabwe and Zambia (Maritz, 2016). Bayer also engages with larger public institutions and private companies that provide training or have access to thousands of farmers to extend its market reach (Maritz, 2016).

Monsanto in South Africa

Monsanto is a pioneer of genetic modification of agricultural crops (ACB, 2005) and the largest maize seed company in the country by sales (DAFF, 2015); it also supplies 90% of soybean planted commercially in South Africa (ACB, 2016). It has been operating in South Africa since 1968 and has licensed its genetic modification technology to other seed companies operating in the domestic market. In the late 1990s it purchased domestic seed companies Sensako and Carnia, thereby taking up a major stake in local seed and grain markets (ACB, 2005). Monsanto sells seed for

alfalfa, canola, corn, cotton, sorghum, soybean, sugarbeets and wheat (Stucke and Grunes, 2016). Monsanto's purchase of global seed company Seminis gave it ownership of plant breeders' rights to a range of South African vegetable seed varieties (ACB, 2005) and access to germplasm. The Sensako purchase gave Monsanto about 45% of the South African agrochemical market for field crops (ACB, 2015b).

In November 2016 Monsanto opened its renovated breeding centre in Petit near Benoni, South Africa (Van Wyngaardt, 2016). The 300 hectare plant breeding farm uses imported and local germplasm to establish new breeding crosses (Van Wyngaardt, 2016). Monsanto also pursues the small-scale farming sector through projects, such as Water Efficient Maize for Africa (WEMA) (Monsanto, n.d.[2]). This project is a public-private partnership that is funded by the Bill and Melinda Gates Foundation, the United States Agency for International Development (USAID) and the Howard Buffet Foundation (Monsanto, n.d.[2]). The project focuses on developing and deploying water-efficient maize to smallholder farmers, along with insect protection technology (Monsanto, n.d.[2]). Monsanto donates maize germplasm and technical advice to farmers in the WEMA project (Van Wyngaardt, 2016). ACB has extensively critiqued this programme for its use of Monsanto's genetically modified drought tolerant maize because the product has not been successful in the United States, and it is inappropriate for smallholder farmers, due to its reliance on the use of synthetic fertilisers and agrochemicals (ACB, 2015a). The project, which is supposedly meant to benefit small-scale farmers, leads them onto a technological treadmill with known environmental consequences and one that is difficult to escape. Farmers have drought tolerant varieties of their own, which are freely saved and thus always available and adapted to localised conditions. Genetically modified crops were also trialled in eight African countries in 2015 (SeedWorld, 2016a) with Monsanto's drought tolerant maize from the WEMA project expected to be released in field trials in Tanzania and Mozambique in 2017.

2016 – The year of the mega-mergers

- **July 2014:** Monsanto tried to buy Syngenta for US\$46 billion, but the deal was rejected by shareholders.
- **November 2015:** Chinese state-owned ChemChina made a US\$43 billion bid for Syngenta, which was accepted by shareholders in February 2016. This was the largest purchase of a foreign firm in Chinese history.
 - ChemChina owns Adama (formerly Maktheshim Agan Industries), the world's seventh largest agrochemical company.
 - The Committee on Foreign Investment in the United States approved the deal in August 2016 (Bloomberg 2016b), South Africa in September 2016 and Australia in December 2016 (Food Ingredients First, 2016). South Africa attached the condition that Syngenta's formulation plant could not be relocated outside of the country for an undefined period to avoid job losses (CCSA, 2016a). The deal was also approved by the Common Market for East and Southern Africa (COMESA) Competition Commission in September 2016 (Comesa Competition Commission, 2016).
 - The European Commission has requested additional information from both companies and will announce its decision on the ChemChina-Syngenta merger on 12 April 2017 (Produce Business UK, 2017).
 - A possible obstacle to approval is ChemChina's plans to acquire another Chinese state-owned fertiliser company, Sinochem, which was not mentioned in the applications for approval of its acquisition of Syngenta (Noel and Baghdjian, 2016).
- **December 2015:** DuPont and Dow announced a merger that will give the combined company an estimated value of US\$130 billion.
 - The deal was approved by the COMESA Competition Commission in September 2016 (Comesa Competition Commission, 2016a), but still awaits approval in Australia, the United States, Brazil and South Africa.
 - The deal is being held up by the European Commission, which has launched a full investigation on the basis that insufficient information has been provided (Reuters, 2016a). The Commission will announce its decision on 6 February 2017 (Investopedia, 2016).
- **May 2016:** Bayer started the bidding process for Monsanto. The \$66 billion bid was accepted in December 2016. If approved, the merged company will be the world's largest seed and agriculture chemicals company. If the merger is not approved by competition regulators, Bayer will pay a US\$2 billion termination fee to Monsanto (Begemann, 2016).
 - The European Commission will decide on this merger by 15 March 2017 (European Commission, 2016).
 - It has not yet been submitted to South Africa's regulators.
- **August 2016:** Canadian Potash Corp. started negotiations to buy fertiliser producer Agrium for US\$30 billion. The deal is expected to close in mid-2017 and will create the largest fertiliser company in the world; it also plans to expand into seeds and crop chemicals (Skerritt and Casey, 2016).

BASF has been left out of the scramble to consolidate and may well have to buy up smaller companies, or sell, because it will not have the strength to take on the concentrated power of its competitors (ETC Group, 2016). Or it could benefit from forced divestitures of the mergers. If all the proposed megamergers are approved, these three companies (ChemChina–Syngenta, DuPont–Dow, Bayer–Monsanto) will own and sell about 60% of the world's patented seeds and pesticides/herbicides (AgriPortal, 2016).

DRIVERS OF CONSOLIDATION IN THE AGRICULTURAL INPUT INDUSTRY

Financial drivers

The downturn in the global agricultural economy, which is compounded by the economic slowdown in China and a systematic overproduction of food that has driven down commodity prices, has meant that farmers have less to spend on supplies and agrochemical companies have experienced lower sales (AgriPortal, 2016). All the companies involved in the mergers, except Bayer, are experiencing shrinking sales (Purdy, 2016), while the costs of operations, research and development have increased (Report Buyer, 2016). Mergers are viewed as a way to cut these costs while maintaining market share and profit levels (Purdy, 2016). Acquisitions help these companies improve and diversify their product portfolio at a reduced cost and improve their competitive advantage (Report Buyer, 2016).

Large investment funds also play a key role in driving the Bayer-Monsanto merger. About 75% of Monsanto shares are held by institutional investors, the largest being the Vanguard Group, State Street Corporation, FMR LLC, Massachusetts Financial Services Co, Blackrock Institutional Trust, Primecap Management, Sands Capital Management and Capital International Investors (Nasdaq, 2017). Of these, the Vanguard Group, Massachusetts Financial Services Co, Blackrock Institutional Trust and Capital International Investors also own shares in Bayer, although institutional investors make up less than 10% of shareholders in the company (4-traders, 2017). The largest institutional shareholders increased their shareholdings in Monsanto in the second quarter of 2016 (Williams, 2017).

The current low interest rates (nearly zero) offered in the United States, the Euro zone, Japan and the United Kingdom (Societe Generale, 2017) are also creating favourable conditions for mergers and acquisitions by

enabling access to cheap capital (The Corner, 2016). This is particularly relevant for the Bayer-Monsanto merger, which is financed primarily with debt – reportedly to avoid it being put to a shareholder vote (Trentmann, 2016). Bayer will take out a bridging loan of about US\$57 billion, underwritten by the Bank of America Merrill Lynch, Credit Suisse AG, Goldman Sachs Group Inc, HSBC PLC and J.P. Morgan Chase & Co. and pay for the balance of the deal in equity bonds (Trentmann, 2016).

The need to own germplasm and traits to remain competitive

The companies are seeking access to proprietary technologies owned by other companies to be able to generate new products. This includes seed but also seed-chemical combinations and genetic modification, breeding and chemical production techniques that have been patented. Germplasm and traits and variety ownership is part of the picture. The merger will enable both companies to pool their technologies without having to worry about competition between themselves, and to overcome closed access to technologies. Monsanto has acquired its market dominance through a series of acquisitions – almost 40 companies, including seed companies and agricultural biotechnology firms, since the 1990s; this has allowed it private ownership of a substantial base of germplasm (Stucke and Grunes, 2016). Monsanto's ownership of 97% of soybean traits, 75% share of corn traits and 96% share of cotton traits in the United States can be considered monopolistic (Stucke and Grunes, 2016), with the ability to set prices. Trait-driven pricing strategies have driven the increase in commercial seed prices over the last decade (Unglesbee, 2016). Monsanto has effectively been able to set prices through its ownership of traits and licensing agreements with other companies (F2F, n.d.). Monsanto already controls most of the hybrid maize seed market in southern and parts of western Africa (Ayeko-Kummeth, 2016). Bayer would secure private ownership of more than 2 000 varieties of seeds for crops, such as corn, soybeans and wheat (Calamur, 2016). The effects of increased proprietary ownership and use of patents are discussed below.



<http://tckctck.org/wp-content/uploads/2011/12/Africa-farming.jpg>

Control of the big data market

The ETC Group, an international civil society organisation based in Canada, notes that the merger is also about gaining control of the big data market in agriculture (ETC Group, 2016). Bayer stated in June 2016 that one of the reasons it wanted Monsanto was to acquire its leadership role in the market for analytics (Satariano and Bjerga 2016). A company with significant ability to crunch new genomics information using seed, soil and weather data would dominate this emergent industry (ETC Group, 2016).

Major biotechnology companies are spending more research and development money on non-genetically engineered products – more on big data, biological seed treatments and the new CRISPR genome editing technology (Schweigert, 2016). This shift is likely driven by cost and the time it takes to get regulatory approval for genetically modified products. The cost to bring a genetically modified seed to market is estimated at US\$136 million and it can take more than a decade, up to seven of which can be consumed in getting regulatory approval for different markets (Deering, 2016).

Total investment by global agribusinesses in agritech in 2015 was between US\$17 and US\$22 billion – an average 5.5% of company revenues (Burwood-Taylor, 2016b). Additional investment of about US\$3 billion by venture capital brings

this to US\$20–25 billion, with most investment going to research and development, mergers and acquisitions, equity stakes and technology centres (Burwood-Taylor, 2016b). Bayer's head of research and development licensing and ventures in North America, Geoff Kneen noted in an interview that the lack of regulatory oversight with digital technology was also appealing in that it was easier to bring these products to markets and gain an immediate return on investment, as opposed to crop chemicals and traits (Burwood-Taylor, 2016).

Monsanto subsidiary, The Climate Corporation announced plans in 2017 to expand its digital agriculture platform in new geographical areas in the next few years, including South Africa (SeedWorld, 2017). The company is the largest in the digital agriculture industry, with the most powerful data science engine and most extensive field research network. Products focus on advanced seed scripting, fertility prescriptions and zone-level nitrogen monitoring capabilities (SeedWorld, 2017). Monsanto reached various licensing agreements with the Broad Institute in 2016 and early 2017 to use CRISPR genome-editing technology, including a global non-exclusive agreement to use the CRISPR-Cpf1 system for agricultural applications (SeedWorld, 2017a). This technology can be used for both agriculture and human health genetic work – providing Bayer with dual benefits.

Monsanto is also partnering with HydroBio Inc. to explore the use of satellite imagery, remote sensing analytics and irrigation management to develop a global irrigation management tool; South Africa is one of ten countries in which this technology is being trialled (SeedWorld, 2016). Bayer has a memorandum of understanding with the aerospace technology company Planetary Resources to develop new agricultural products using satellite images (SeedWorld, 2016b). There are rumours of future merger possibilities between companies such as Bayer-Monsanto and John Deere (the leading manufacturer of farm machinery) to integrate big data expertise and precision planting technologies (ETC Group, 2016). A previous attempt by Deere and Company to buy Monsanto's precision planting division was blocked by the United States Justice Department in November 2015 because it would allow Deere market control for high-speed precision planting systems, enabling them to raise prices and slow innovation (ETC Group, 2016).

The need to find new markets

The merger is also likely driven by the need to find new geographical markets. Increased operational, regulatory and research and development costs are forcing seed companies to grow in size (through mergers and acquisitions, as well as joint ventures) to realise economies of scale and the expected return on investment (Schenkelaars and Magnier, 2011). This means always expanding into new markets. Bayer will benefit from accessing Monsanto's dominant share of the market in the United States and Latin America and Monsanto from Bayer's bigger share of the market in Europe and the Asia-Pacific region (FinancialTimes 2016). In South Africa, Monsanto, Pioneer Hi-Bred/Pannar and Klein Karoo Seed hold nearly 70 % of the maize seed market and more than half of all varieties of the top eight crops: maize, soybean, wheat, dry bean, sunflower, barley, grain sorghum and groundnut (DAFF, 2015). While it is impossible to quantify individual market share because of company confidentiality, Monsanto is believed to be the largest by sales (DAFF, 2015). While Bayer does not enjoy this level of control in the seed sector, its stated plans are 'expanding our seed footprint – especially for soybeans

and wheat – through further acquisitions, in-licensing agreements and partnerships' (Bayer 2016). The combined buying power of the new company could see a further spate of vertical consolidation and squeezing out of smaller competitors. In addition, given Monsanto's extensive market reach in South Africa, Bayer would benefit from being able to access wider and established markets for its crop protection products.

CONTESTING THE MERGER

The proposed merger is horizontal and vertical in nature because both companies are in the same markets and the deal would extend control along the supply chain (CCSA and Competition Tribunal South Africa, 2009) – incorporating intellectual property rights, germplasm, breeding programmes, technology, propagating material, crops and accompanying crop protection products.

Horizontal mergers can result in a reduced number of competitors and have public interest implications (CCSA and Competition Tribunal South Africa, 2009). Countries will approach the request for approval of the merger in different ways. The United States will take a holistic look at the market to see how the proposed mega-mergers will affect the entire market and China will subject all three deals to an anti-monopoly review (*Financial Times*, 2016). China also solicits feedback from state-owned enterprises before ruling on international mergers (*Financial Times*, 2016). The European Commission traditionally reviews mergers independently of each other, but will review the three mega-mergers in their totality to explore the likely implications.

Mergers and acquisitions of this scale are typically reviewed by competition authorities on the lines that consolidation can decrease competition and create or boost the position of a dominant market player. Competition is viewed as a vital component of continuing innovation.

The mandate of South Africa's Competition Commission

(Source: CCSA and Competition Tribunal South Africa, 2009; CCSA, 2016)

South Africa's Competition Commission was created to monitor and, where necessary, redress the effects of the apartheid government's protection of major corporations' control over core service industries. Many value chains, including agro-food, however, are increasingly concentrated with high levels of vertical integration. South Africa's Competition Act evaluates mergers on whether they will substantially prevent or reduce competition by exploring the following aspects, among others:

- Actual and potential level of competition with imports in the market;
- Levels and trends of concentration and history of collusion in the market;
- Degree of countervailing power in the market and dynamic characteristics of the market, including growth, innovation and product differentiation; and
- Nature and extent of vertical integration and whether the merger will result in the removal of an effective competitor.

The Competition Act seeks to 'prohibit anticompetitive practices that allow dominant firms to abuse their market power and it seeks to minimise the opportunities for collusion.' Furthermore, 'If the merger is deemed to be anti-competitive, then the commission must consider whether the technological and/or efficiency gains will offset this and it is obliged to consider public interest issues.'

It will also consider whether the merger will result in significant negative public interest effects on a particular industrial sector or region, employment, the ability of small businesses and firms controlled or owned by historically disadvantaged persons to become competitive and the ability of national industries to compete in international markets. To this end, it will explore whether local production and manufacturing facilities will be affected, whether locally produced goods will be substituted by imports, whether local or regional supply chains will be impacted, if there will be a significant effect on social projects or local resources, and whether it will impact on regional sustainability or public policy goals. This paper argues that even the current level of consolidation in the market further entrenches a system of farming based on synthetic inputs that is not environmentally or socially sustainable. Traditionally, the Competition Commission places the most emphasis on potential loss of employment.

A note on efficiency gains

Even if a merger would result in less competition, it can still be approved on the basis that it offers efficiency gains. In South Africa, these gains need to be verified, but not quantified, implying that companies are not required to prove the level and amount of efficiencies that will be generated, or the implications of these efficiencies for the broader public.

If it is found that the merger will reduce competition, the various competition commissions around the world will evaluate the merger on the grounds of efficiencies. While both companies argue that they will

be able to operate more efficiently if they merge (Purdy, 2016) with the end goal of delivering higher returns to shareholders, it is unlikely that farmers and consumers will in any way benefit from more 'efficient' operations. Efficiencies encompass cost savings from shifting production to lower-cost centres, increasing total output at lower average administration and operational costs (reaching economies of scale) and making technological progress (European Commission, 2006). Enhancing efficiencies is only of benefit to consumers when prices are lowered or if products are improved to such a degree that it offsets costs staying the same (European Commission, 2006). Bayer will integrate

its expertise in pesticides with Monsanto's capacity in seed genetics and biotechnology with expected synergies amounting to US\$1.5 billion by 2020 (Bunge and Alessi, 2016), but there is no detail given as to where and how these synergies would materialise, and what would be lost. It is notoriously difficult to quantify and verify claims of future increased efficiency.

A critique of the Bayer-Monsanto merger notes that often companies can reasonably achieve claimed efficiencies through other means and that farmers and consumers have not benefitted from previous consolidation in the industry (Stucke and Grunes, 2016). Neither Bayer nor Monsanto have demonstrated how claimed efficiencies will benefit the broader public. The claim that achieving such efficiencies through integration of expertise in seed genetics and biotechnology is also of concern because it further orients seed selection and breeding towards those that are compatible with or respond to the use of particular fertilisers, pesticides and herbicides. This practice and the focus by agrochemical giants on commodity crops genetically engineered primarily to tolerate proprietary chemicals has diminished the quality of plant breeding for conventional varieties because resources have been steered towards bio-engineered plants. This has also led to an increase in the use of crop chemicals (ETC Group, 2016a) and a decrease in agricultural biodiversity.

The merger would allow both companies to reduce their overhead costs by aligning their product supply chains, as well as marketing, sales and distribution infrastructure (Bayer, 2016). They would also be able to realise synergies by combining product offerings (Bayer, 2016) in that they can sell complementary products from each company using one marketing and distribution channel. Thus, it is no surprise that financial investors have pushed for the merger. The cost savings can be significant; for example, the Dow-DuPont merger will lead to estimated cost savings of about \$3 billion (Kaskey and Casey, 2015), which is relevant to shareholders, but does not benefit users of their products or the broader public.

Reducing competition in the seed and agrochemical markets

Competition commissions focus on maintaining levels of competition in markets particularly if the merger will create or strengthen a dominant player. If both the Bayer-Monsanto and the Dow-DuPont merger are approved, an effective global duopoly would be formed based on control of even more significant vertical integration between traits, seeds and chemicals (Deering, 2016). All of the companies involved in the mega-mergers were required to appear before the United States Judicial Commission on the Consolidation and Competition in the United States Seed and Agrochemical Industry (Deering, 2016) to respond to the critique of reduced competition. This is also one of the key issues that the European Commission will consider in its review. The European Commission has already noted the significant consolidation of the market and that the parties hold relatively high combined market share in some geographical and product sectors (European Commission, 2016). It also has noted that the merger could decrease the available supply of active ingredients on the market, which are used by other manufacturers (European Commission, 2016) and that it is increasingly accepted that market concentration increases the likelihood of collusion (European Commission, 2006). Bayer has bought companies such as Aventis CropScience, Plant Genetics Systems, Planttec, Prosoy Genetics and Athenix and has cooperation agreements with Evogene (rice research), Mertec (soy research) and Futuregene (cotton research) and with the Commonwealth Scientific and Industrial Research Organisation (wheat research) and the Brazilian Centre for Sugarcane Technology (ASEED, 2013) to this end. The merger would provide the new company with control of 70% of the United States cottonseed market (Financial Times 2016).

A recent analysis of food and agricultural supply chains in South Africa looked at the implications of market power in complementary inputs sectors (Çakır and Nolan, 2015). It found that when oligopoly power is found in complementary input streams (seeds and herbicides, for example), there are likely to be greater welfare losses

for both consumers and producers. The South African market for maize, soybean, cotton and other commodity crops is already controlled by an oligopoly. Critics note that the merger would enhance Monsanto's already significant market power, particularly in genetic traits and herbicides (Stucke and Grunes, 2016), because since the early 2000s Bayer has been steadily moving into the genetically modified seed sector and would have increasingly provided competition for Monsanto in the South African market (ASEED, 2013). The merger will thus further boost Monsanto's dominant market position through Bayer's complementary product offerings and access to additional capital to capture new markets on the rest of the continent.

The merger could also effectively diminish actual and potential competition in the South African market if the merged company used licensing restrictions to stop rivals from stacking their own traits on other seeds using Monsanto- or Bayer-owned traits. It could essentially 'foreclose' others' traits, seeds and herbicides by making packages of 'seeds-traits-and-chemicals' that only work with one other herbicide (Stucke and Grunes, 2016) and making it harder for smaller players to enter the market (*Financial Times* 2016). Given Monsanto's dominance in South Africa's genetically modified seed market, this could diminish the choice available to maize, soy and cotton farmers. This is something that Monsanto has done before in the United States.

Monsanto's foreclosure of innovation in cottonseed

(Source: Stucke and Grunes, 2016)

Monsanto owns 96% of cotton traits patented in the United States. This means a *de facto* monopoly regarding the setting of prices and terms through cross-cutting licensing agreements. In the early 2000s it prohibited seed companies from stacking non-Monsanto traits in their cotton seeds. This was challenged in 2007 and Monsanto was forced to revise its terms for a period. The same judgement does not apply to the other seed traits that Monsanto owns or in other jurisdictions.

Decreasing innovation

The merger is not just a mere technical question of competition policy; it goes far beyond. The world needs innovations that serve to bring about socially just and climate-resilient societies. The kind of thinking necessary for this does not tend to happen in in-house 'captive' research and development models, which tend to deliver incremental innovations within specific categories (World Economic Forum, 2015) and principally for profit. This kind of innovation tends to happen through collaborative relationships based on a genuine exchange of knowledge. In the agricultural sphere, these kinds of relationships would include participatory research with agendas set by farmers who provide input not only into the challenges that research and development needs to meet, but also into the way in which such research is conducted. In this sense the consolidation of the industry into three major global players will further entrench the enclosure of knowledge generated in research and development processes, using intellectual property regimes, among other tools. And as the mergers speak to both vertical and horizontal consolidation, this enclosure will encompass the entire value chain.

Both companies argue that the merger will enable more effective innovation resulting in more choice in products of higher quality (Bayer, 2016). But decreased competition is believed to affect innovation levels (European Commission, 2016) in that the reduction of the number and focus of research and development processes reduces the opportunities for original discoveries. Internal research and development is costly and time-consuming and a merger or acquisition provides a 'short cut' to acquiring the desired technology and the experience in using it (King and Schimmelpfennig, n.d.). Taking this short cut, though, means that previously parallel research and development processes that might have generated new innovations are now combined and focused to the single company's benefit (Stucke and Grunes, 2016).

The market for agricultural biotechnology development is already extremely concentrated – just six companies account for more than 80% of crop field trials for regulatory release in



http://www.scidev.net/objects_store/thumbnail/F3A2A2AA5074D436F403B2E017118993.jpg

the United States and they also control the bulk of private-sector agricultural biotechnology patents issued in the United States (King and Schimmelpfennig, n.d.). These are Dow, DuPont, Monsanto, BASF, Bayer and Syngenta (King and Schimmelpfennig, n.d.). If all the mega-mergers are approved, the research and development base will be controlled by just three main players. In South Africa, Monsanto and Pannar-DuPont-Pioneer employ 80% of private-sector maize breeders and all the soybean and sunflower breeders for variety production (TASAI, 2015). A merger will reduce diversification of research and development, channelling resources into a narrow range of profitable products. It moves in the opposite direction to widening the base of productive activity, which is at the centre of South Africa's transformation challenge.

Monsanto notes that it had increased its investment in research and development from about \$300 million in 2000 to \$1.5 billion in 2016 (Purdy, 2016). And, according to Bayer, the combined companies will have a research and development budget of about €2.5 billion and will be able to accelerate innovation and improve their products by combining their expertise and experience (Bayer, 2016). This claim must be viewed within the larger and significant trend towards the privatisation

of agricultural research in recent decades. There are concerns about the incentives that shape the direction of future research and development (European Commission, 2006), which is increasingly set towards a narrow and profit-oriented agenda. Having a dominant market share will result in research and development being skewed towards high-profit proprietary products (European Commission, 2016) as opposed to appropriate products for Africa and South Africa's farmers, who need to build resilience to deal with a changing climate and face a degrading natural resource base and increasingly expensive input market.

In South Africa, total expenditure on agriculture-related research has increased significantly, but spending and orientation of the research is led by the private sector (Kirsten, Stander and Haankuku, 2010). This increase is contrasted with the declining research performance of public-funded institutions, such as the Agricultural Research Council, which is underfunded (GrainSA, 2015). In 2000 the council was the country's largest agriculture research institute, accounting for almost 60% of the country's research expenditure and researchers (GrainSA, 2015). Increasingly private agricultural firms, including seed and agrochemical companies in South

Africa have formed subsidiary agreements with multinational companies (GrainSA, 2015). This means that most innovations are imported or adapted and distributed under license from international firms or parent companies (GrainSA, 2015). Research efforts in South Africa are primarily directed to performing on-farm trials and testing new products developed by the foreign parent companies before releasing the products onto the local market (GrainSA, 2015). This is not aligned with serving the real needs of South Africa's farmers, who need affordable seed that helps them to build climate-resilient farming systems. It also does not encourage the emergence of context-specific innovations.

Further entrenchment of intellectual property rights regimes

Patents and other forms of intellectual property rights, such as plant breeders' rights effectively allow corporations to play a gatekeeper role in the agriculture sector (Moss, 2011). Companies with dominant market share not only make it more difficult for smaller companies to enter the market, but also shape the market and its future pathways in ways that preclude opportunities for a more agroecological model of farming to emerge, one that is built on social justice and equity. This is done by diminishing and or blocking the space for alternative models to emerge, including in industry forums (which multinationals dominate in South Africa) and policy discussions. Extended patent and plant breeders' rights make innovative activity for others more expensive; these systems of intellectual property disproportionately benefits larger firms, who can afford to 'protect' their innovations and to take legal action against those who use them without paying royalties (Wiens and Jackson, 2015). This has major implications for seed prices and for farmer use and adaptation of available seed to their conditions.

Licensing agreements are one of the factors driving up commercial seed prices. Developers wanting to make incremental improvements on seeds need first to gain and pay for licensing rights (Brewster et al, 2007; Clift, 2007; De Schutter, 2009). The merger would enable Monsanto and Bayer to capitalise on lower or

no licensing fees, but might push prices up for other developers wanting to access traits. While a future of genetically modified food is a not a desirable one, the capacity of these companies to impose and restrict licensing fees on this technology retains their focus on seeds of this nature, as the seed becomes the property on which profit is made. The 2008 International Assessment of Agricultural Science and Technology Development (supported by the United Nations and the World Bank) notes that increasing use of patents is restricting research and knowledge dissemination (ASEED, 2013). Farmers' ability to save and re-use seed poses an inconvenience to seed companies that use legal mechanisms to protect their ownership rights (Blakeney, n.d.). Where traits or varieties can be protected for exclusive use, future research is limited, as is seed saving and farmers' traditional practices of on-the-ground varietal development (Blakeney, n.d.).

In South Africa, SANSOR argues that 'brown bagging' and farmer-retained seed pose a threat to ongoing research and investment in new variety development with new technologies. Seed companies say that the practice of saving seed (about 80% of soy plantings and 70% of wheat plantings) prevents new cultivars and the latest technologies from coming to South Africa (GrainSA, 2015). Farmers have maintained viable farming operations throughout Africa by saving and exchanging seed. It is this practice that has enabled genetic diversity as farmers have been able to select seed and breed it for a variety of traits, including drought resistance, flavour and cultural preferences.

In May 2016, the Wheat Forum applied for a statutory levy to be applied on wheat, barley and other winter cereals at point of sale (Staatskoerant, 2016). A request was also made by Grain SA, Agbiz Grain, SANSOR and the Agricultural Research Council for the establishment of a breeding and technology levy on wheat, barley and other winter cereals – with the possibility of expanding this to other self-pollinating crops (Staatskoerant, 2016). The levy would effectively collect royalties on behalf of seed companies for produced yield when delivered and sold (GrainSA, 2015). This move would effectively block farmers' access

to market if payment for intellectual property rights is demanded and not paid.

This system would serve the interests of multinational corporations – Monsanto is a major supplier of canola and wheat seeds and Bayer is planning to expand its wheat footprint (Bayer, 2016) – in that the state would effectively finance the collection of royalty payments, thus allowing the companies to transfer the transaction costs of royalty collection and property rights enforcement onto society at large (GrainSA, 2015).

Public benefit aspects and implications for farmers

Reducing competition and innovation carry implications that will be considered by all the regulatory bodies consulted for this merger – in particular, whether it will likely increase the costs of inputs and reduce choice for farmers. These have particular relevance for South Africa's farmers.

The prices of agricultural inputs could increase

Consolidation resulting in a lack of competition is linked to price increases for agricultural inputs (Purdy, 2016; Stucke and Grunes, 2016). The significant extent of consolidation that has taken place in the seed industry between 1994 and 2004 aligns with the more than doubling of crop seed prices relative to the price that farmers receive for commodity crops (Stucke and Grunes, 2016). For example, the significant cost difference in genetically modified seeds in the United States and South Africa is due in part to the lack of competition from other genetically modified seed companies in the South Africa (Grain SA 2013).

Seed prices began rising exponentially after the introduction of genetically engineered varieties in the mid-1990s, particularly for maize, cotton and soybean (Then and Tippe, 2009). In the United States, farmers have seen the costs of corn seed grow by 52% between 2012 and 2015 and the costs for both corn and soy increased more than 300% from 1995 (Nosowitz, 2016). American farmers note that the already high prices for biotech seed minimises and sometimes even negates the returns they can

make from farming (Paul, 2016) and the cost for this seed has almost doubled in the last two decades, driven by the increased stacking of licensed genetic traits (Stucke and Grunes, 2016), as well as increased operational and input costs.

Drought conditions have also played a part in rising prices in recent years. Prices had traditionally been correlated with the associated commodity prices, but the introduction of monopoly protection for seed traits provides a direct incentive for companies to want an ever-increasing return on their investment (Then and Tippe, 2009). This is compounded by the shift in this market to using stacked gene traits – the more included, the higher the revenue for the company, both through own sales and through licensing for others (Then and Tippe, 2009). An estimated 74% of the cost of corn, soybean, cotton and sugarbeet seed in the United States and the European Union is for technology fees or seed treatment (Stucke and Grunes, 2016). And as these seeds cannot be legally saved and re-used in these countries, farmers are obliged to pay to renew seed each year.

Monsanto has used its market domination to block competition before. When Dupont tried to develop herbicide resistant seeds using conventional breeding in partnership with Asgrow, Monsanto bought out Asgrow and forced it to breach its contract with Dupont (Then and Tippe, 2009). Effectively, Monsanto was 'successful in establishing a network of dependencies, licenses, ownerships and penalties, which tied consumers to its product' (Then and Tippe, 2009:12).

African countries are still in the process of reforming their seed laws with plant variety protection systems that are biased towards commercial breeders and discriminate against farmer-managed seed systems. The proposed royalty collection at point of sale in South Africa will serve the purpose of forcing farmers to pay for seeds, whether they have saved them or not. In cases where seed saving is prohibited, the opportunity for on-farm plant breeding is also negated, along with the opportunity for seeds to adapt to local climates.

Biotech seeds cost about twice as much as

conventional seed and these costs have risen by more than 140% since 2001 (Douglas, 2016). Yet, there is no visible corresponding benefit in terms of higher yields or greater returns to farmers (Stucke and Grunes, 2016). This is of particular concern in South Africa where most maize is genetically modified and while it might generate higher yields, it is at a greater cost – both environmentally by reducing biodiversity and the accompanying inputs polluting groundwater – and economically by placing farmers on a technological treadmill that requires them to buy seed anew each year. Any significant increase in input costs, particularly seed, will have a dramatic effect on the ability of those African small-scale farmers (more predominantly in South Africa) using commercial seeds to remain financially viable (Ayeko-Kummeth, 2016). Just as in the United States, commercial seed as an input cost rose significantly in the five years to 2012 (Statistics South Africa, 2012), at an average of almost 18% a year. This is credited to the increasingly consolidated nature of production and distribution (Stoddard, 2011), as well as rising operational costs; drought conditions have also played a role in driving up prices. Prices of maize seed increased by 5.6% between 2014 and 2015 (GrainSA, 2015). Maize seed constitutes about 12% of a producer's variable production costs (GrainSA, 2015). The price for sorghum seed has increased by 10.4% over the period, soybean by 4.4% and sunflowers by 4.3% (DAFF, 2015b). GrainSA notes that the consistent increase in seed prices is becoming a major concern to grain producers (GrainSA, 2015). Seed prices increased by at least 2% more than the producer price index for the period (GrainSA, 2015). The cost for crop protection products increased by 6.3% between 2014/15 and 2015/16 and the cost of fertiliser by 5.2% (DAFF, 2016).

ACB's submission to the Competition Commission's hearing regarding the merger of Pioneer and Pannar in 2011 noted that an increase in seed price of 10% (which was calculated by CompCom SA) would have a devastating effect on South Africa's 1.2 million small-scale commercial and subsistence farmers (ACB, 2015b). The cost of seed is perhaps not such an issue for contexts where smallholder farmers still save and exchange seed, but as agents of the Green Revolution

in Africa move to 'modernise' these systems through programmes, initiatives or state-sponsored input subsidy programmes, farmer seed systems will become increasingly stressed. Both Bayer and Monsanto have announced their plans to expand further on the African continent with a particular focus on smallholder farmers.

Farmers on the continent typically operate within lower or non-existent profit margins (Ayeko-Kummeth, 2016). Seed, if bought, can comprise up to 50% of input costs for small-scale and subsistence farmers (Mayet, 2012). Any increase in price can therefore affect food production or farming viability for those already caught in the treadmill of purchased seeds and accompanying inputs (Swanepoel, 2014). Large-scale input subsidy systems are often used to lower the price of inputs for smallholders in African countries with various negative consequences, including the expense borne by the public purse to profit private seed and fertiliser companies, the marginalisation of necessary support to create a viable farming future – such as enhanced storage capacity – and the steering of traditional agricultural systems to input-dependent ones.

The choice of available inputs could decrease

With the narrowing of innovation resulting from corporate concentration, the number of commercial products available could likely decrease, leaving farmers with less choice as to what inputs they use (Stucke and Grunes, 2016). There is an incentive in a merger situation to decrease options as market share increases and perhaps to produce only seed that is 'geared to their model of production, which is a chemical model of production' (Court, 2016). United States farmers note that they are already paying for seeds with traits that they don't want and need, or that prevent the seed from customising to particular geographies (Court, 2016).

The anti-trust chief of the European Union, Margrethe Vestager noted that farmers must continue to have a choice when buying seeds and pesticides after the merger, including a choice about the agricultural framework from which they purchase inputs, and that the market was already very concentrated (Reuters,



– <http://agriprofocus.com/upload/post/Seeds.jpg>

2016). The point about having a choice of agricultural frameworks is particularly relevant, given that farmers are increasingly encouraged through large-scale initiatives (funded by organisations such as the Bill and Melinda Gates Foundation and the Alliance for a Green Revolution in Africa), South African government policy, and, on rest of the continent, through input subsidy programmes towards industrial farming that is focused on increasing yields using synthetic inputs.

While it could be argued that given the already consolidated nature of the market, the merger will not affect this framework, it will further entrench the future direction of the farming system and marginalise more sustainable models, such as agroecology, which is increasingly called for by organisations representing African smallholder producers, such as the Alliance for Food Sovereignty in Africa. It could lead to further marginalisation of traditional knowledge about natural methods of pest control or in situ plant breeding, for example. Through the encouragement of overreliance on synthetic inputs to solve problems, it can also marginalise other pressing concerns, such as levels of wastage, lack of relevant and context-specific research and access to markets.

There are concerns regarding how the merger will impact on seed markets and whether it will severely limit the variety of seeds on the market by squeezing out some due to licensing restrictions and increased use of patenting –

ultimately this would reduce consumer choice (Joyce, 2016).

A genetically modified future for Africa's staple food crops?

There is little room for expansion of the genetically modified seed market in industrialised countries and those that have allowed cultivation of these crops (SeedWorld, 2016a), whereas there is an estimated potential market of 25 million hectares in Africa for genetically modified maize alone (SeedWorld, 2016a). Developing countries have planted more genetically engineered crops than industrialised countries for the past four years (SeedWorld, 2016a). Africa, in particular, provides an unsaturated market for this technology. There is still plenty of space in the African market to sell off old technology and realise profits. The merger would likely lead to fewer non-genetically modified options being made available to farmers (Stucke and Grunes, 2016) as the new company seeks to maximise its return on investment in genetically engineered seeds and multiple traits, especially in the maize and cotton markets.

Monsanto has been able to manipulate the market by increasing its prices for single trait and double-stacked varieties, while reducing options for single trait and conventional varieties in its own range and that of subsidiary companies (F2F, n.d.). While South Africa remains an outlier in its adoption of genetically modified crops on the African continent, there is a push for other African countries to draw up bio-regulatory frameworks, establish regimes for the protection of plant breeders' rights, upgrade their intellectual property systems and roll out programmes, such as WEMA, that could end up being vehicles to disperse genetically modified crops to small-scale farmers.

The implications for food security

Food prices started rising steeply in 2005 and even more rapidly in 2008 – an estimated 45% increase in the world food price index (Shah, 2008). Despite record grain harvests in 2007, 2008 is known as one of food crises; there was more than enough food produced to meet demand, but people could simply not afford to buy it (Shah, 2008). As people went hungry, the profits of dominant actors in the seed

supply and grain trade soared – Monsanto's profits grew by 45% in this period (Shah, 2008). A similar increase in food prices, although with fewer dramatic impacts on consumers, occurred in 2011. Only in the last years have global food prices fallen, although not in South Africa. The number of food insecure people living in the countries that make up the Southern African Development Community (SADC) has increased from 10.3 million in 2014 to 13.4 million in 2015 (DAFF, 2015).

Availability of food is not the main issue in South Africa, but rather people's ability to access it; i.e. to afford it or to produce it directly. This makes food price increases and the factors driving them political and economic issues – not an agricultural productivity issue. If, as argued earlier, these mergers increase the cost of agricultural inputs, this will have long-term effects on the price of food. While producers may have to absorb rising input costs because of market constraints, the long-term effect is likely an increase in the cost of food. Short-term implications of absorbing costs mean making farming operations even more 'efficient'; i.e. externalising the costs to the environment or to labour, which has serious consequences in the South African context with high unemployment rates (the expanded unemployment rate for black South Africans has remained stagnant at 41% for the last three years (PACSA, 2016), and poor employment conditions on farms.

The National Agricultural Marketing Council of South Africa (NAMC) estimates that the price of maize meal increases on average by 0.33% for every 1% increase in the price of maize (GrainSA, 2015). This can have a significant impact on the ability of the poorest to buy maize meal. The Council's August 2016 report notes the significant inflation regarding food costs for an urban food basket of 23 basic items, which includes maize (NAMC, 2016). Food price inflation at 11.3% is nearly double the overall inflation figure of 6% (NAMC, 2016). The price of super maize, for example, has increased by 32% and that of special maize by 70% over the course of a year (NAMC, 2016). Despite international prices for maize falling by nearly 10% over the 12 months, the local price increased by 19.81% (NAMC, 2016), partly because of drought conditions.

The implication for the poorest 30% of the population is that they are now spending 57% of their monthly income on food, as opposed to 49% in July 2014 (NAMC, 2016). The studies conducted by the Pietermaritzburg Agency for Community Social Action (PACSA) provide a more nuanced and on-the-ground picture, although a contextual one. PACSA tracks the cost of the monthly food basket in low-income areas to illustrate the impact of food price inflation on low-income families. Their findings indicate that the country's unemployment crisis, low wages and rising prices have wiped out the buffers of low-income households, who are now forced to compromise even further on the quantity and quality of food they consume (PACSA, 2016). Their research has found that the increase is in fact higher than official statistics, because most women in low-income households are buying what they term the 'big foods' – maize meal, rice, cake flour, white sugar and cooking oil – first and the increase in cost of these is 25% (PACSA, 2016). Maize meal, the most important component, is the biggest driver of inflation; the price of a 25kg bag of maize meal increased by 32.2% over 12 months (PACSA, 2016). Thus, while many factors have an impact on food accessibility, and a direct link between concentration of the seed sector and food prices is difficult to prove, there is a real risk that excessive market power in the seed sector will translate to higher food prices in the mid- and long-term.

Both Bayer and Monsanto argue that the merger will help them to tackle issues of food insecurity, as well as other social challenges. Both companies argue that combined they will be able to feed an expanding population in a sustainable way (Court, 2016). If the companies mean to say that their products will generate higher yields and therefore enable smallholder farmers to realise greater returns on their crops, generate more income and thus be able to ensure their own food security, this is disputed by evidence on the ground in Africa. Research done by ACB and others in several African countries indicates that farmers are more often trapped in a technological treadmill that they find difficult to leave. The additional income generated through the possible increased yields are offset by the cost of inputs and depressed market prices as farmers tend to grow the same crop within the same location

and sell onto the same market. The adoption of intensive production using commercial seed and agrochemicals has had negative environmental effects in many regions, most notably in Malawi – the poster child for Green Revolution technologies. For smallholder farmers to achieve sustainable farming, they require recognition of their importance and role in food production, support in boosting their own agricultural knowledge, platform sharing for such knowledge, egalitarian seed systems, appropriate storage technologies to reduce post-harvest losses and access to markets. A merger between Bayer and Monsanto does not speak to these issues.

Concerns around governance of the seed and agrochemical sectors

If approved, the merger would grant Bayer and Monsanto even more power in governance structures in South Africa's seed and agrochemical sectors. Monsanto sits on the board of directors of SANSOR and the executive council of CropLife SA, to which Bayer is also an executive member. Combined, the companies would be able to exert even more influence over the direction of these sectors and when giving policy advice to government.

CONCLUSION

The proposed merger between Bayer and Monsanto will result in one company controlling around 30% of the global commercial seed market and almost 25% of the global pesticide and herbicide market. In South Africa it will control about 30% of both markets. If this merger and those of DuPont-Dow and ChemChina-Syngenta are allowed, just three companies will own and sell about 60% of the world's patented seeds and pesticides/herbicides. From a corporate perspective, the most likely rationale to merge is cost savings in research and development, but through eliminating parallel processes, and enabling access to proprietary knowledge, safeguarded by patents. As both Monsanto and Bayer increasingly move into the big data sector of agriculture, there are benefits for them in pooling their resources in efforts to dominate this emergent market.

The merger, which is yet to gain regulatory approval in the 30-odd countries it needs to apply to, will be disallowed by regulatory authorities if it is found that it will reduce competition in an already consolidated market, and possibly enhance Monsanto's domination in the market place. These regulatory bodies will also consider the likely implications of innovation being reduced through research and development processes being aligned and whether the merger will lead to increases in input prices for farmers and decreased options regarding choice of seed.

This study found that the potential Bayer-Monsanto merger would have significant negative impacts on the seed and pesticide sector, as well as for farmers and food consumers in South Africa. Based on the specifications laid out in the national Competition Act, the South Africa Competition Commission should, therefore, reject the merger plans of the two companies. In South Africa the industry is already significantly consolidated, with just three major players – Monsanto, Pioneer Hi-Bred-Pannar, and Karoo Seed – already owning nearly 70% of the top eight crop varieties. The merged company could shut out competition from other companies that use Monsanto's traits in their varieties if the new company chose to make packages of 'seeds-traits-and chemicals' that only worked with one another. In addition, our results show that the combined buying power could support a further spate of vertical consolidation, given that both companies plan to expand their footprint in Africa, with a focus on smallholder farmers. The alignment of research and development processes would also eliminate the possibility of Bayer offering Monsanto real competition through its seed development activities.

Beyond this, there are public interest issues that need to be considered in South Africa. The merger entrenches further proprietary ownership of germplasm – Bayer would access more than 2 000 varieties of seeds for crops, such as maize, soybeans and wheat – the latter are key focus areas for the company. Locking up germplasm behind patents in an intellectual property regime contradicts the urgent need to open up and share knowledge in the

agricultural space and to provide effective and relevant support to Africa's farmers, so that they can realise food security and increase their livelihoods without being trapped in a technological and pesticide treadmill that is becoming increasingly expensive and is ecologically damaging.

If input costs increase as a result of the merger, this will have significant and far reaching implications for the cost of food. South Africa and the broader region are, until today, facing a certain degree of food insecurity. Food security in this region is not related to agricultural productivity, but to broader systemic political and economic aspects. It is also likely that this merger, as well as the others, will steer

us further into unsustainable industrial agriculture that has not proved successful for smallholder farmers and has resulted in a series of negative consequences – the externalisation of environmental effects of using synthetic inputs, forced urbanisation as farms consolidate to reach the necessary economies of scale, and reliance on expensive external inputs supplied by multinational corporations, that in no way prepares them for the effects of a changing climate. In short, the merger further narrows the possibilities for alternative and more sustainable systems to be supported, such as agroecology, which is increasingly called for and supported by smallholder farmers, scientists and civil society around the world.

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