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“Agriculture is a scam!”: Agrotechnologies and the agrarian fallacy among African grain farmers in colonial Zimbabwe, the 1920s to 1970s

List of Abbreviations

DDT Dichlorodiphenyltrichloroethane
GMB Grain Marketing Board
NAD Native Affairs Department
NLHA Native Land Husbandry Act
SRFU Southern Rhodesia Farmers Union
SR-52 Southern Rhodesia–52

Introduction

Addressing delegates at a private function for non-governmental organizations in Japan in 2023, former US president Jimmy Carter argued that “Africa needs genetically modified crops” to address its deteriorating food security and scarcity woes. He added that it was “misguided to tell people that genetically modified seeds are poisonous…misleading sometimes gullible and ill-informed African and other leaders, that we cannot accept these seeds.”[1] Fast forward to early 2024, political analyst and social media commentator Rutendo Matinyarare was served a cease-and-desist letter, filed by Innscor Africa in response to his protracted claims that the food giant was producing products that contained “GMOs (genetically modified organisms) and were harmful to the general Zimbabwean population.” Matinyarare added that these food products were “destroying the taste of Zimbabwean food” and had no nutritional value. They also adversely altered the natural cycle for quality produce by relying on chemicals widely shunned globally. This case divided social opinions, mainly because of Rutendo’s political leanings and commentary that fueled tribalism, as well as previous allegations of pedophilia.

The subject of genetically modified food crops remains widely contentious and unresolved. On one hand, while many believe that such innovations aim at

1 “Africa needs GMO crops: Carter,” *The Chronicle*, September 5, 2023.

https://doi.org/10.1515/9783111611358-007

addressing the imploding global food security crisis amid an anthropogenic slow violence of climate change, many others are concerned that the cocktail of chemicals and processing methods involved poses a harmful threat to humans, animals, and environmental welfare. Some scientific studies have even argued that the consumption of GMO food crops can lead to severe short-term and long-term illnesses among consumers.[2] Quoting Albert Schweitzer, environmentalist Rachel Carson laments that "man can hardly even recognize the devils of his own creation."[3] Until now, agricultural and food innovations such as GMOs, chemical fertilizers, and hybrid seeds have become the main way towards sustaining food security.

In southern Africa, particularly in Zimbabwe, agrotechnologies, including chemical fertilizers, herbicides, insecticides, and hybrid seeds, were increasingly introduced from the early 1920s to save hard-hit colonialists by increasing their yields and generating wealth from agricultural production.[4] From white settlers' arrival and colonialism in 1890, the modification of the environment was becoming increasingly noticeable, characterized by tracks of vast cash crop agriculture and environmental exploitation. Adding to this, these changes also altered local cultures and the everyday life of different African communities. For example, colonialists violently lobbied to dismantle African agricultural and economic dominance by replacing the African staple small grains of sorghum and millet with white maize.[5] Through land alienations and financial and material initiatives for white farmers, the colonial state embarked on an agrarian agenda that underlined "maize is Rhodesia's friend," and invested heavily in boosting white maize production.[6] The next few decades were characterized by heightened agrarian

2 Joël Spiroux de Vendômois et al., "Debate on GMOs health risks after statistical findings in regulatory tests," *International Journal of Biological Science* 5;6, 6 (2010): 590–598. Also see David Zilberman, Tim G. Holland, and Itai Trilnick, "Agricultural GMOs—What We Know and Where Scientists Disagree," *Sustainability* 10, no.5 (2018): 1514.

3 Rachel Carson, *Silent Spring* (London: Hamish Hamilton, 1963), 3.

4 James McCann, *Maize and Grace: Africa's encounter with a New World crop, 1500–2000* (Cambridge, Mass.: Harvard University Press, 2005), 141–147.

5 Bryan Kauma and Sandra Swart, "'Many of the dishes are no longer eaten by sophisticated urban Africans': A social history of eating small grains in Bulawayo, Southern Rhodesia (Zimbabwe) c. 1920s to the 1950s," *Revue d' Histoire Contemporaine de l' Afrique* 2 (2021): 86–111.

6 Arriving in present-day Zimbabwe in 1890 with the hope of finding mineral prospects similar to those in South Africa, early white colonialists instead worked towards transforming the colony into the agricultural hub of the region through cash crop production of mainly maize, tobacco, and cotton. Government funding and support for white commercial farmers was through various material, policy, and financial initiatives such as the creation of a Land Bank, the production of a Farmer' s Handbook, and the pronouncement of Diet Ordinances from 1908, inter alia, aimed at promoting the local agrarian sector. Also see Victor Machingaidze, "The Development Of Settler

transformation from subsistence production to widespread commercial cash cropping of maize, tobacco, and cotton. By the early 1950s, the gospel of fertilizer use to improve agricultural and maize harvests was commonplace across most parts of Southern Rhodesia. By 1953, the state-controlled Agricultural Rural Development Authority had deployed over 680 agricultural demonstrators across the country to educate Zimbabwean farmers on the use of fertilizers to counter the yield and acreage concerns associated with the 1951 *Magna Carta* Native Land Husbandry Act (NLHA), which reallocated cultivation spaces.[7] In parts of Europe and the Americas, Arturo Warman notes, the use of modified hybrid seeds, herbicides, and fertilizers revolutionized and tremendously improved both the quality and quantity of farmers' yields.[8] Similar outcomes were expected in Southern Rhodesia.

Drawing on primary and secondary sources, this chapter revisits Zimbabwe's agrarian history and explores Zimbabwean grain farmers' experiences with agrotechnologies—notably chemical fertilizers, herbicides, and hybrid seeds—during the colonial period. The response of black Africans to the agrotechnologies varied, marked by growing racial and cultural skepticism, misuse of new technologies, and significant economic barriers to access. These innovations had uneven effects on production. While some black farmers thrived, foiled yields became a recurring motif for others. Some farmers believed their agricultural failure was tied to ancestral retribution against adopting white-introduced fertilizer and hybrid seeds that slowly eroded their spiritual connections with the land, ancestors, and cultures connected with grain production.[9] This chapter further shows how poor instructional use of different fertilizers, hybrid seeds, and pesticides left many farmers confounded with poor harvests.

Meanwhile, overshadowing indigenous concerns, the Department of Native Agriculture paternalistically continued to promote chemical fertilizers, pesticides, and hybrid seed, leaving a toxic footprint on African productivity. African yields remained meagre with extended episodes of hunger. Adding to these troubles, these innovations spurred rapid environmental decay, cultural dilution, and

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Capitalist Agriculture In Southern Rhodesia With Particular Reference To The Role Of The State, 1908–1939" (PhD diss., University of London, 1980).

7 R.W. Johnson, "African agricultural development in Southern Rhodesia, 1945–1960," *Food Research Institute Studies, Stanford University, Food Research Institute* 4, no.2 (1964), 1–59.

8 Arturo Warman, *Corn Capitalism: How a botanic bastard grew to global dominance* (Chapel Hill: University of North Carolina Press, 1988), 73.

9 Ian Scoones, "Religion and agriculture: reflections from Zimbabwe," Zimbabweland, accessed January 24, 2025, https://zimbabweland.wordpress.com/2022/11/21/religion-and-agriculture-reflections-from-zimbabwe/.

white monopolistic control within grain production infrastructure. Southern Rhodesia's grain sector became the center of racial, cultural, and economic tensions and power struggles.

Endangered African grains – A historical conversation

The history of land, agrarian and food production is long and deeply contested in Zimbabwe. Historiographically speaking, for Africa, this conversation is enduring and often emotive as it encapsulates the traumas and legacies of land disenfranchisement, racial inequality, and cultural alienation from the colonial period. James McCann observes how, for example, the introduction of agricultural technologies, including hybrid seeds and fertilizer use in southern Africa, marked a significant shift in agrarian practices that reconfigured racial relations and exposed the widening inequalities within colonial economic and social policies in Zimbabwe.[10] As this chapter adds, the politics of access to and postharvest agrotechnologies exposed the class and cultural tensions that underlie agrarian society. Meanwhile, introducing agricultural extension services in colonial Zimbabwe provided support and resilience for white farmers while imposing unfamiliar agrarian patterns on black smallholder farmers.[11]

Globally, agricultural transformation through the introduction of agrotechnologies and innovations has produced diverse outcomes. In Mexico, during the 1940s to 1960s, Ronald L. Phillips argues that the development of high-yielding wheat and rice varieties was able to revive food production and increase food supplies, thus staving off widespread starvation.[12] In stark contrast, across parts of Africa, the introduction and use of similar agrotechnologies over the nineteenth century increasingly led to extensive agricultural exploitation and a focus on non-food crops like tobacco and cotton. As Elijah Doro and David Hughes observe, the methods used culminated in massive deforestation, displacement, and hunger.[13] Frederick Cooper summarizes that, because many communities' livelihoods

10 McCann, *Maize and Grace*, 94.

11 Eira Kramer, "The Early Years: Extension Services In Peasant Agriculture In Colonial Zimbabwe, 1925–1929," *Zambezia* 24, no.2 (1997): 160.

12 Ronald L. Phillips, "Green Revolution: Past, Present, and Future," in *Encyclopedia of Agriculture and Food Systems*, ed. N. K. Van-Alfen, vol. 1 (London: Elsevier, 2014), 529–538.

13 Elijah Doro, *Plunder for Profit: A Socio-Environmental History of Tobacco Farming in Southern Rhodesia and Zimbabwe* (Cambridge: Cambridge University Press, 2023), 97 and David Hughes,

relied on agriculture, agrarian capitalism and agrarian reforms impacted productivity and determined African exposure to poverty.[14] The use of different chemical fertilizers was targeted at reorganizing and "modernizing" the Zimbabwe landscape.[15]

Different studies have reflected on how African lives and intimacy with their environment have been violently disrupted by settler colonialism and ecological domination, which have committed environmental injustices against local people.[16] Smallholder African farmers faced several operational constraints, including being relegated to cramped spaces with low soil fertility, having limited access to inputs, and facing stiff competition from government-supported commercial white farmers. Compounding this, labor shortages in African resettlements across Zimbabwe soared as more and more Africans migrated to work on white farms and industries in response to growing hunger in communal reserves. At the same time, by the early 1960s, a distinct class of African agrarian bourgeoisie was developing, and suggestions by traditional leaders to use cow dung as a substitute for more expensive fertilizers recommended by agricultural demonstrators, for example, stirred resentment among farmers.[17] As Baxter Tavuyanago et al. contend, black farmers' growing social and class actualization localized the adoption and widespread use of various agrotechnologies within African spaces. However, this was not without its challenges.[18]

From Enslavement to Environmentalism: Politics on a Southern African Frontier (Seattle: University of Washington Press, 2011), 127–130.

14 Frederick Cooper, *Africa in the world: Capitalism, Empire and Nation-state* (Cambridge, Mass.: Harvard University Press, 2014), 3.

15 Esbern Friis-Hansen, *Seeds for African Peasants: Peasants' Needs and Agricultural Research–The Case of Zimbabwe* (Uppsala: Nordic Africa Institute, 1995), 19–21.

16 Jessica Urwin and Rohan Howitt, "Histories and legacies of extraction and toxicity: An introduction," *International Review of Environmental History* 9, no.2 (2023): 3.

17 Trevor Ncube, "Peasant Production and Marketing of Grain Crops in Zimbabwe 1890–1986: An Overview," *Handerson Seminar Paper* 72 (1987): 15.

18 Baxter Tavuyanago, "Traditional Grain Crops In Pre-Colonial And Colonial Zimbabwe: A Factor For Food Security And Social Cohesion Among The Shona People," *Journal Of Sustainable Development in Africa* 12, no.6 (2010): 6–8. By the 1960s, whiteness and its social and economic influence had gained significant traction across the colony. Scholars like Michael West note how the development of an African bourgeoisie middle class was largely influenced by cross-racial interactions that exposed black Africans to a myriad of spaces to experience, and some enjoy, the services and experiences preserved for whites and elites. This inspired upward social and economic mobility among Africans and equally accounts for the motivation by many Africans to explore the Master Farmer certificate, which was a gateway to closer proximity to whiteness. See Michael O. West, *The Rise of an African Middle Class: Colonial Zimbabwe, 1898–1965* (Bloomington: Indiana University Press, 2002).

Debates about the use of agrotechnologies, such as hybrid seeds, fertilizers, and pesticides, grew in momentum at the turn of the twentieth century amid growing concern over their impact on the earth's ecological systems. Julie Guthman highlights the paradox of organic farming, noting the conflicts between big and small farms in agrarianism, particularly regarding social justice and ecological sustainability.[19] For farmers in California, USA, and black farmers in Southern Rhodesia alike, farming was not just a business but a lifestyle that encapsulated their spiritual, social, and political well-being. However, with the advent of venture capital, agriculture became heavily commercialized, pushing more farmers to adopt and rely on agro-innovations to meet growing market demands. California and Southern Rhodesia became the highest users of pesticides in agriculture. California became renowned as the agricultural capital of the US, while Southern Rhodesia earned the title of the region's breadbasket. However, as Eira Kramer,[20] Eira Punt,[21] and Victor E. M. Machingaidze,[22] point out, successes in agriculture were not enjoyed across the board, and in Southern Rhodesia, agricultural services and technologies remained largely unevenly distributed, with African farmers not reaping the same benefits as their white counterparts.

Reinforcing this point, Bryan Kauma and Sandra Swart,[23] along with Aisha Machingauta,[24] observe how policies such as the Maize Control Act of 1931 acted as a buffer against the economic impacts of the great depression for white farmers. These policies brought no positive benefits to black African farmers who were effectively barred from trading their grain in lucrative markets at competitive prices. In addition, institutional support for postharvest logistics, such as storage, transport, and marketing crops, was highly skewed against African farmers, further contributing to their ongoing struggles to adequately finance and support their production in the following agricultural season. Dharam Ghai and Lawrence D. Smith argue that agricultural policy introduced during the colo-

19 Julie Guthman, *Agrarian dreams: The Paradox of Organic Farming in California* (Oakland: University of California Press, 2004), 12.

20 Kramer, "The Early Years," 161–164.

21 Eira Punt, "The Development Of African Agriculture In Southern Rhodesia With Particular Reference To The Interwar Years" (Master's diss., University of Natal, 1979), 35.

22 Victor E.M. Machingaidze, "Agrarian Change from above: The Southern Rhodesia Native Land Husbandry Act and African Response," *The International Journal of African Historical Studies* 24, no.3 (1991): 557–588.

23 Bryan Kauma and Sandra Swart, "Hunger and Power: Politics, Food Insecurity and the Development of Small Grains in Zimbabwe, 2000–2010," *Historia* 67, no.1 (2022): 189.

24 Aisha Mashingauta, "Power and hunger: the state, farmers, and the Grain Marketing Board in Zimbabwe, c. 1980–2017" (PhD diss., Stellenbosch University, 2022).

nial years manifested variously in hunger and poverty.[25] It slowed economic growth and undermined agricultural performance among black farmers, who struggled against settlers who received state institutional support that maintained their economic and ideological hegemony in key areas of national development. As a result, the gap between food production and availability widened, and agrarian stagnation deepened on black farms, resulting in increased vulnerability. Indeed, Geoffrey Banda's analysis of the evolution of grain markets reveals how a lack of control of seeds undercut African agricultural production, thereby severely compromising food security for most Zimbabweans."[26] For many desperate farmers, their "harvest was stolen" by embracing new crops and agro-innovations that promised to improve agricultural output rapidly but ultimately did not.[27]

In a balanced thirty-two-chapter volume, Richard Sikora et al., comprehensively analyze the multifaceted challenges affecting agricultural production and food security in Southern Africa.[28] The second part of the book, attentive to shifts within agrarian policy, underlines the role of historical antecedents in causing widespread hunger and poverty in the region. This serves as a strong introduction to part four, which presents a focused discussion on emerging technologies that address growing food and agricultural concerns in postcolonial southern Africa. The chapter by Paul Vlek, Lulseged Tamene, and Janos Bogardi draws attention to the application of chemical fertilizers and underscores how their use has resulted from unregulated land use and management. They argue that most parts of southern Africa are conducive to cultivation. However, natural vegetation has suffered significantly due to intensive cash crop production, which ushered in new farming systems that altered soil and water mineralization, thus reducing their productive functions.[29] The volume clearly identifies both the positive and negative ecological and cultural impacts of emerging agrotechnologies, such as hybrids and fertilizers, on fostering sustainable agricultural development.

Today, different scholars attribute cycles of food insecurity to poor agricultural practices that have been exacerbated by years of soil degradation. The exten-

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25 Dharam Ghai and Lawrence D. Smith, *Agricultural Prices, Policy, and Equity in Sub-Saharan Africa* (Colorado: Lynne Rienner, 1987), 99–102.

26 Geoffrey Banda, "Evolution of Zimbabwe' s maize innovation ecosystems: Building an institutional innovation infrastructure that supports food security," *Africa Development and Resources Research Institute (ADRRI) Journal* 47, no.3 (2022): 167–195.

27 Vandana Shiva, *Stolen Harvest: The hijacking of global food supply* (Cambridge: South End Press, 2000), 22.

28 Richard A. Sikora et al., eds., *Transforming agriculture in Southern Africa* (London: Routledge, 2020).

29 Paul Vlek, Lulseged Tamene and Janos Bogardi, "Land rich, but water poor," in *Transforming agriculture*, Sikora et al., eds., 39.

sive and widespread use of chemical fertilizers and intensive cultivation has led to a rapid decline in soil fertility. To combat this, agriculture experienced an era of experimental growth with heightened soil, water, and plant science experiments aimed at optimizing food productivity. Building on Helen Tilley's view of rural Africa as a "living laboratory" for European growth, William Masters argues that the introduction of (chemical) fertilizer and hybrid seed use in (southern) Africa was largely experimental.[30] This chapter highlights how perilous this was to African farmers anticipating bumper harvests. In the early 1960s, Western postwar aid programs in Africa, promoted under the banner "Decade of Development," aimed to harness modern technologies to transform rural spaces into highly productive agricultural factories based on experimental models trialed in Latin America. The Green Revolution introduced hybrid seeds, chemical fertilizers, and pesticides to "awaken the agricultural and economic dormancy of developing nations."[31] Yet, for example, the short-lived American rust crisis affecting white maize in Southern Rhodesia revealed how introducing chemical fertilizers was not only an object of scientific empirical study but also part of a new strategy to globalize intensive grain production.[32] This was Carson's central critique: chemicals were used without accounting for their biological and ecological consequences on human and nonhuman life.

Works by Malene Friis-Hansen,[33] and Mandivamba Rukuni,[34] highlight how seed sovereignty has been a historically contested issue in Zimbabwe's agrarian history. Control over maize seed enabled farmers to have more control over their agrarian trajectory. By extension, this helped provide more economic and social mobility opportunities. Conversely, other postcolonial scholars have positively viewed the paternalist hand of the colonial and postcolonial state in African agriculture. Maintaining colonial policy, following independence, more than 85% of smallholder farmers continued to use hybrid maize seed and a combination of chemical fertilizers. From the late 1970s onwards, improvements within African agriculture have been characterized by what scholars, including Mandivamba Rukuni and Carl K. Eicher, have described as Zimbabwe's 1980s Agricultural Rev-

30 William Masters, *Government and agriculture in Zimbabwe* (Westport: Praeger, 1994), 63.
31 David Kinkela, *DDT and the American Century: Global Health, Environmental Politics, and the Pesticide That Changed the World* (Chapel Hill: University of North Carolina Press, 2011), 107.
32 McCann, *Maize and Grace*, 121–125.
33 Friis-Hansen, *Seeds for African Peasants*, 55–56.
34 Mandivamba Rukuni, "The evolution of irrigation policy in Zimbabwe, 1900–1986," *Working paper AEE* 4, no.86 (1986): 14.

olution.[35] Ian Scoones et al. would further demonstrate that historical government support, through farm mechanization and the distribution of (hybrid) maize seed, fertilizers, and pesticides, greatly contributed to the successes of Zimbabwean farmers. They argue that this support extended to the land reform exercises of the early 2000s.[36] However, Eric Makombe maintains that, without structural reforms within key institutions such as the Grain Marketing Board (GMB), African producers could not enjoy the full economic value of their crops.[37] These ongoing issues impacted food security as farmers shifted to non-food crops like tobacco, which received better investment from the state and private sector.[38] Helen A. Curry concludes that the state's continued lack of investment in proper education regarding the correct application of fertilizers, herbicides, and pesticides for food crops exacerbated food insecurity.[39] This enabled settler farmers to dominate and monopolize the food production sector throughout the colonial period (and beyond).

Mtakati ya vayungu ('Magic of the white man'): The development of agro-innovations

To this day, much of Zimbabwean society, like in many other countries, continues to view the use of genetically modified, hybrid seeds and chemical fertilizers in food production with incredulity, seeing them as a panacea to food insecurity. When chemical fertilizers were first introduced in Southern Rhodesia by American-educated Emory D. Alvord in 1921 in Mount Silinda, Chininga district, local farmers and community leaders alike marveled at the results of his "proper tillage" methods. This earned Alvord the title *mtakati ya vayungu* ('white man's magic') from nonplussed African farmers who were curious about the quality and quantity of the maize and other crops grown on the demonstration plots next to their withered plots. That year, the best maize yield was about 32 bags of 200

35 Mandivamba Rukuni and Carl K. Eicher, *Zimbabwe Agricultural Revolution* (Harare: University of Zimbabwe Publications, 1994).

36 Ian Scoones et al,, "Livelihoods after Land Reform in Zimbabwe: Understanding Processes of Rural Differentiation," *Journal of Agrarian Change*12, no.4 (2012): 503–527.

37 Eric Makombe, *Agricultural Commodity Pricing Policy in Colonial Zimbabwe: with Particular Reference to the Settler Maize Industry: 1950–1980* (Riga: VDM Verlag Dr. Müller, 2011), 52.

38 Geoffrey Banda, "Evolution of Zimbabwe's Maize Innovation Ecosystems: Building an Institutional Innovation Infrastructure That Supported Food Security," *Africa Development,* 47, no.3 (2022): 167–95.

39 Helen A. Curry, *Endangered Maize* (Oakland: University of California Press, 2022), 99, 127.

lbs. per acre.[40] Some African farm workers, including those who participated in the crop cultivation, were convinced that the white agriculturalist had "gone out in the night to sprinkle magic medicine on the crops," as none of them had ever seen a harvest half as good as this one.[41]

The initial excitement surrounding the use of fertilizers in agriculture triggered a slow but steady growth in the sector over the following decade. By 1932, Southern Rhodesia had established a domestic fertilizer industry, producing phosphatic fertilizers at an affordable cost for the local commercial market.[42] Alvord emphasized that using fertilizers was a revolutionary step towards improving yields and enabling farmers to counter the vagaries and unpredictability of nature, such as soil infertility, pests, and low rainfall. The post-depression years further accentuated the need for greater control of agrarian production by both black and white farmers. Alvord's position was bolstered when successive dry spells during the planting season, stretching over nine weeks in the late 1930s and early 1940s, scorched vast areas of cultivated land beyond recovery.[43] The severity of these successive dry spells did not spare the crops of white farmers, who suffered similarly. Yet, crops on the demonstration plots in Mount Silinda managed to survive and flourish, barely affected by the vagaries of the drought.[44] This prompted the Agriculture Department to advocate for the intensified use of fertilizers across the farming districts to improve maize yields.

Meanwhile, African millet and sorghum fared comparatively better. However, Alvord added that there was an essential need to explore alternative maize grain varieties that could survive these perilous dry periods. As Kauma and Swart argue, this aimed to exclude the reliance on African small grains produced by African farmers.[45]

The Department of Agriculture brought together scientists from the little-known Matopos Research Station to develop a local hybrid maize seed suited to Rhodesia's climate. Speaking in 1948, an official from the Department of Native Agriculture expressed growing concerns over what they believed were unresponsive seeds, attributing the issue to the degradation of the soil after years of con-

40 A. G. Davis, "The work of ED Alvord," *Zambezia* 19, no.1 (1992): 48–49.

41 E. D. Alvord, *The development of native agriculture and land tenure in Southern Rhodesia*, 1958, 6.

42 Masters, *Government and Agriculture*, 63.

43 Various agricultural crop assessment reports by the Department of Native Affairs between 1931 and 1945 labelled Agriculture Department Crop reports, *Rhodesia Agricultural Journal.*

44 Alvord, *The development of native*, 7–8.

45 Kauma and Swart, "Many of the dishes," 86–111.

tinued misuse by African farmers.[46] The official pointed to the increasingly erratic application of a combination of natural and commercial fertilizers, which led to poor cultivation patterns. Notably, there was no regulatory control over fertilizer use among African farmers, who continued to make extensive use of these fertilizers, even in times of good rainfall. In good seasons like 1946, grain crops grew three times more than usual, producing a bountiful harvest.

In stark contrast, crops perished irretrievably within a short time during dry seasons, as was the case the following year. The department's main observation was that soils and pests were fast becoming impervious and resistant to the current forms of fertilizers and pesticides.[47] According to the Pasture Research Chemist report in 1950, although crops displayed positive nutritive value during the early weeks of planting, herbage declined during the growing season, and further, by the time of harvesting in March of the following year, they lacked protein and mineral elements (measured in lbs. per acre).[48] Crop survey reports in 1951 noted that existing seed and fertilizer combinations produced an average total of 353 bags of maize, a decrease from 474 bags per year. Fertilizers were no longer efficient, and this rapid decline justified the essential need for a hybrid seed that would revitalize the agricultural landscape.

Fertilizers and hybrid seeds: "Winning the hearts and minds" of farmers

Colonial rule saw government intervention in agricultural production through the implementation of ambitious agricultural development schemes. These development initiatives were primarily aimed at increasing and controlling the production and marketing of cash crops, including maize. Within a decade, the government's Department of Native Agriculture had built on work initiated by Alvord, bringing years of work by scientists from the Federation of Rhodesia and Nyasaland to fruition with the introduction of a hybrid maize seed variety in 1952. This new hybrid seed was called SR-52 (Southern Rhodesia–52) and was developed from the commercial maize seeds produced at the Henderson Research Station and

46 "Annual report by the Commissor for Native Affairs, year ended 1948", *Native Affairs Department Annuals* (hereafter NADA), 12.

47 *NADA*, "Annual Commissioner Report", 1950, 12.

48 H. Weinmann, *Agricultural research and Development in Southern Rhodesia* (Salisbury: University of Rhodesia, 1975), 138.

marketed by the Southern Rhodesia Seed Maize Association.[49] This was a momentous feat as Southern Rhodesia became the first country in the world to produce a single cross-hybrid grain seed locally. Despite unpredictable and unfavorable rainfall patterns, this seed was tailor-made to boost maize production. White commercial maize farmers welcomed this innovation and hailed it as a "miracle…one that would transform African landscapes." In stark contrast, the introduction of the seed sparked racial tensions regarding African diets and culture, as it received a lukewarm response from African farmers. These reactions were not uncharacteristic nor surprising, especially to the officials of the Native Affairs Department (NAD), who had had several tense encounters with African communities opposing settler attempts to change their agrarian livelihoods and diet.[50] Since the introduction of chemical fertilizers and herbicides to African farmers, the Department for Native Agriculture had increasingly recorded complaints, cases of illness, and even deaths, due to suspected "vegetable poisoning."[51] Some farmers complained about the foul smell emanating from the plants and soils, noting that the fertilizer had altered the taste of their food. Others observed changes in the color and texture of the soil.[52] Over the next few years, the Chemistry Branch within the government's Agriculture Department became inundated with carrying out soil sample tests to identify the best soil, fertilizer, and seed combinations.[53]

The 1953 agricultural season produced over 12,000 bags of hybrid maize, with 1,600 bags available for export. According to James McCann, in the first two decades after its release, SR-52 performed well, raising maize yields on commercial farms by more than 300 % over the previous decade.[54] Undoubtedly, the entry of hybrid seed to the market was a significant innovation, but selling it to African farmers remained a challenge. Around two years after the introduction of SR-52, about 55 % of the country's large-scale white-owned farms were planting hybrid maize. This number was notably lower on African plots, with records indicating almost 22 % acreage. However, these dynamics would shift as agricultural demonstrators increasingly encouraged farmers to combine hybrid seeds and fer-

49 Memorandum by the Director of Agriculture for 1952, December, 1952, National Archives of Zimbabwe, Box S482/781/39, 21.

50 Report of the Chief Native Commissioner, January,1925 – 1939, *The Native Affairs Department Annuals*, 12 – 19. NAZ, Box S482/781/39.

51 "Agricultural lives of Natives," *NADA*, 1955, 29

52 Muneta. G Manzeke, "The Effectiveness of Different Fertilizer Formulations in Alleviating Zinc Deficiency in Smallholder Maize Production Systems in Zimbabwe" (Master's diss., University of Zimbabwe, 2013), 67.

53 "Report on Overseas visit concerned with Seed and Soil testing and production," *Rhodesia Agricultural Journal*, 1939, 25.

54 McCann, *Maize and Grace*, 141.

tilizers. As the following section will show, by 1967, more than 93% of cultivated land used SR-52 and a form of fertilizer.

The combination of hybrid maize seed and chemical fertilizers yielded positive results, compensating for the enormous investments made in agricultural research since the interwar period. Disruptions from the war witnessed scores of African farmers reverting to bone meal, blood meal, and bat guano fertilizer options as chemical fertilizer deliveries imported via the Beira port were affected.[55] The freight cost further rendered these fertilizers expensive, adding to the burden of restrictive, lucrative grain prices for African grain set by the Maize Board (which became the Grain Marketing Board two years later in 1954).[56] The discovery and exploitation of phosphate deposits at Dorowa, in eastern Zimbabwe, was a significant game-changer for the local fertilizer and grain industry, promising growing economic prospects. White commercial farmers quickly began using phosphate chemical fertilizers, applying about 150–200 lbs. per acre of superphosphate every other year. This rotation was largely due to the high price of chemical fertilizers. As a more cost-effective alternative, farmers more commonly mixed two-thirds superphosphate, a third bonemeal, and SR-52, which yielded an average of 170 lbs. of grain per acre.[57] Similarly, a complete NPK fertilizer application was ideal for tobacco plants, costing a hefty £4 per acre in the 1940s. The 1950s witnessed a growing use of nitrogen-based fertilizers for tobacco, but these were not used for maize due to the strong and lingering odor they imparted to the crops. This period marked a notable increase in agriculture fertilizer imports, from £49,105 in 1924 to over £175,118 by 1940, and a steep postwar rise to £605,575 in 1950. Southern Rhodesia was on its way to rebooting its agrarian productivity.[58]

The relationship between fertilizer imports and the total area of cultivated land reflects the considerable investment in intensifying fertilizer usage. By 1955, African farmers had cultivated about 27,296 acres under state support

55 Report of the Secretary of Agriculture, October, 1954, Box, NAZ 1070/1, 56.

56 Commodity Marketing Board increasingly became the colonial state' s central mechanism to monitor and control production within the colonies. These boards were given supervisory power to regulate terms and conditions for commodity production and distribution. In practice, they formalized and protected white monopoly interests within key agricultural and production sectors through pricing, zone delimiting, and market allocations. Also see William O. Jones, "Food-Crop Marketing Boards in Tropical Africa," *The Journal of Modern African Studies* 25, no.3 (1987): 375–402 and Godfrey Hove, "Creating order and stability? The Dairy Marketing Board, milk (over) production and the politics of marketing in colonial Zimbabwe, 1952–1970s," *Historia* 58, no.2 (2013): 119–156.

57 Weinmann, *Agricultural*, 171.

58 Alvord, *The development of native*, 62.

through irrigation and fertilizer use. In 1956, grain yield reached a peak of around 156,256 bags, and the NAD noted how this was an increase of on average just under 6 bags per acre.[59] For a program in its infancy, using hybrid seeds, irrigation, and fertilizers proved promising, especially in an area with a long history of crops that often suffered during periods of low rainfall. As the NAD celebrated this milestone, not all local African farmers were caught up in the excitement, with some raising their concerns about overreliance on scarce water from the dams shared with animals and the declining annual rainfall. Needless to add, irrigation and fertilizer schemes seemed to benefit those in closer proximity to the dams.

Over time, agricultural systems evolved, shifting farming patterns along with the mutating socio-ecological and political landscape. Historian Tinashe Takuva argues that agricultural production was political, as historically, African agriculturalists believed that "rains come from the gods."[60] A bountiful harvest was an ancestral blessing, and thus some African farmers opposed using the white man's agricultural innovations, such as irrigation, fertilizers, and hybrid seeds that were said to help plants grow.[61] The massive drought that coincided with the arrival of the white settlers in 1890 and other successive natural disasters, including locust invasions, when farmers first experimented with fertilizers, were naturally taken as a sign of disapproval from the ancestors by many farmers.[62] But these innovations stirred more indignation as some crops seemed to thrive while others struggled aesthetically, leaving their owners disappointed. Johnson observes how farmers who failed to recognize the potential of fertilizers, hybrid seeds, and irrigation would later emulously note how crops planted using these innovations reached a peak height above one and a half meters and displayed a robust

59 Alvord, *The development of native*, 64.

60 Tinashe Takuva, "'Rains Come from the Gods!': Anthropocene and the History of Rainmaking Rituals in Zimbabwe with Reference to Mberengwa district, c. 1890–2000," *South African Historical Journal* 73, no.1 (2021): 138–161.

61 Hilda Kuper, Hilda, A. J. B. Hughes, and J. Van Velsen, *The Shona and Ndebele of Southern Rhodesia* (London; Routledge, 2017), 36. Over the years, African agriculture had been expanding, incorporating the use of various tools and ideas, some brought by early European traders and settlers. For example, tools, such as the plough was introduced around 1908 and revolutionized the time and ability to till the soil. New crops, including maize, different varieties of fruits and herbs/spices were also introduced to African farmers.

62 "Rain and their traditions in the low Mzingwane and Beitbridge area," *NADA*, 1961, 55–57. Also see Admire Mseba "Politics, Techno-Science, and the Environment: The Late Twentieth-Century Challenges of Locust Control in Post-Colonial Southern Africa," *Journal of the History of Medicine and Allied Sciences* (2024).

dark green color for most of the planting season.[63] Different records from the Department for Agriculture underline how beautifully hybrid crops grown with fertilizer turned out, bringing jubilation to their farmers.[64] These crops grew to huge, unprecedented sizes and experienced fewer issues from pests or the vagaries of nature. Farmers rejoiced at the sizes of their crops, and by extension, this encouraged others to embrace these agrotechnologies. By the end of the 1950s, over 2,500 acres of demonstration breeding plots were cultivated, and SR-52 occupied about 22% of the total area, yet produced over 43% of the total crop.[65]

At the same time, the superabundant crops attracted the attention of local authorities, who took the opportunity to subtly coerce more African farmers into embracing and using chemical fertilizers and hybrid seeds. One common strategy was to reward farmers with incentives, including subsidized agricultural inputs, such as fertilizers, seeds, pesticides, or financial aid to assist and offset labor and other production and marketing costs.[66] As the succeeding section will further elaborate, African farmers whose crops showed significant quality and quality improvements were also recognized with a revered Master of Tillage certificate. This certificate offered unveiled contract farming opportunities to enable them to further increase the amount of land under their acreage.[67] Perhaps more importantly, this recognition became an essential social and economic marker and a gateway towards accessing lucrative markets for their crops. This was significant because it had the potential to increase their income from their crops.

According to Liza Grandia, the introduction of both new crops and new agrotechnologies have historically faced notable resistance. For example, in Guatemala, she discusses the "milperos dilemma," where locals defended their sacred maize grain production against "an invisible technology threat in a world of interconnected trade and corporate aggression" in the food production sector.[68] These new introductions would essentially reconfigure their social connections with agricultural production. Similarly, in Zimbabwe, using compound fertilizers and hybrid seeds like the SR-52 brought new social complications, unexpected by farm-

63 RWM Johnson, "African Agricultural Development in Southern Rhodesia, 1945–1960," *Food Research Institute Studies, 4, 1963–4, no.2*, 179.

64 "A preliminary report on the distribution of SR-52 in Marandellas and Mrewa", *Rhodesia Agricultural Journal*, 1957, 3.

65 Weinmann, *Agricultural,* 196.

66 Weinmann, *Agricultural,* 196.

67 Admire Mseba, *Society, Power, and Land in Northeastern Zimbabwe, ca. 1560–1960* (Athens, OH: Ohio University Press, 2024), 111.

68 Liza Grandia, *Kernels Of Resistance, Maize, Food Sovereignty And Collective Power* (Seattle: University of Washington Press, 2024), 7.

ers. For example, Karanga and Ndau farmers relied on plant ash to help protect their seeds from soil weevils and other pests that often ate the hearts of the grain seeds.[69] Under these so-called primitive agricultural conditions, the farmer had few insect problems. The intensification of agriculture and the devotion of immense acreages to a single crop unsettled the natural ecosystem. As Carson summarizes, these fertilizers and pesticides "simplified it" without considering the "built-in checks and balances by which nature holds the species within bounds."[70] Insects that helped the crop grow became adversely affected by the increasing use of fertilizer, triggering a chain reaction affecting soil fertility and texture, and nutrient quality of grain crops. Adding to this, the lack of strict and careful attention to measurements further risked crop damage.[71] Although some agricultural demonstrators emphasized the need for accurate measurements when applying fertilizer and pesticides, many farmers traditionally relied on visual estimations when using other natural agricultural methods, tools, and aids.[72] Unlearning these practices was not without its short and long-term consequences, including scant crop growth, yellowish burns on maize crops, and uneven stock counts on individual maize stems.

In response, to ameliorate soil productivity, African farmers began to move away from using chemical fertilizers and instead often deployed traditional agricultural techniques, which relied less on expensive and inaccessible external resources.[73] Legume-cereal rotation of maize and cowpeas boosted soil fertility while also addressing food scarcity concerns, by reducing the risk of crop failure associated with sole cropping. Increasingly into the 1970s, the colonial state intensified its research into the interplay between agriculture, soil, and nutrient uptake when using hybrid seeds and fertilizers in Zimbabwe.[74] The Department of Agriculture led efforts to conduct soil fertility surveys across the country's agroecological regions, with varying results. A notable finding related to seasonal variations and how season-to-season crop patterns impacted peasant production, primarily

69 Silindiwe Zvingowanisei, Sophia Chirongoma and Ezra Chitando, "Karanga Women and Indigenous Knowledge Systems (IKS): Towards enhancing Agricultural Production and Food Security in Zimbabwe," *African Thought: A Journal of Afro-centric Knowledge*, special edition 2, no.1 (2022): 217.

70 Carson, *Silent Spring*, 3.

71 Paul Harrison, *The greening of Africa* (London: Paladin Grafton Books), 107–108.

72 "In line with modern day concepts," *The Bantu Mirror*, August, 14, 1967, 3.

73 "In line with modern day concepts," 3.

74 Bryan Kauma, "Winner of the Southern African Historical Society' s Student Essay Prize in 2019: 'Small Grains, Small Gains': African Peasant Small Grains Production and Marketing in Zimbabwe during the Colonial Period, c.1890–1980," *South African Historical Journal* 73, no.2 (2021): 257–287.

because farmers tended to alter their cultivation practices based on the previous season's outcomes. The increased use of hybrid seeds and fertilizers struggled to compensate for dwindling fallow periods, adversely impacting yields. The gospel of fertilizer and hybrids was emphasized to regulate cropping even within poor soil areas. However,, low yields and soil infertility adversely affected livestock, with fertilizer solution often leading to livestock risking cross-contamination.[75]

Meanwhile, in other areas such as Nyanyadzi in the eastern highlands of Zimbabwe, the chemical fertilizer and SR-52 combination was popular among the over 300 families occupying the floodplains. In 1954 alone, these households were able to produce more than 10,000 bags of grain from the Nyanyadzi irrigation project.[76] Although this amount was lower than the projected output of 15,000 bags, the outcome demonstrated the potential of fertilizer and irrigation programs. The Agriculture Department planned a quadrupled harvest with the use of hybrid seeds. This alerted the colonial state to the agricultural potential of African producers. They believed that intensified use of fertilizers, insecticides, and hybrid seeds would positively transform the trust lands, thereby reducing African reliance on state food support.[77] This was thus used as justification for further appropriation of African lands by the colonial state, and intensification of the agro-innovations with hybrid seeds, fertilizers, and insecticides becoming a significant cornerstone of the Land Husbandry Act. African socio-economic interests had been sacrificed at the altar of settler political and economic hegemony through the intensified use of hybrid seeds and fertilizers.[78] While there were some discussions about their adaptability to differing climatic and soil conditions, this interest was brief and ultimately short-lived.

Master farming and agricultural toxins from above

Land was an important capital asset in Southern Rhodesia and globally. By the mid-1950s, blacks made up over 85% of the population and occupied 30.4 million acres of land, while the minority white population of 6.8% occupied 48 million

75 "Report of the Dept of Agriculture, dated 31st March 1971," NAZ, Box 32986.

76 Dickson Mungazi, *Colonial agriculture for Africans* (New York: Peter Lang, 1998), xxvii.

77 Peter Uledi and Godfrey Hove, "Developmental inequality and living on the margins in post-colonial Zimbabwe: the case of Musana District," *African Affairs*, 13, no.3 (2021): 56–70.

78 Machingaidze, "Agrarian Change," 562.

acres.[79] Analyzing the land tenure system, Machingaidze underlines how spaces occupied by black populations experienced overcrowding and overstocking. Land is necessary in order for people to survive. However, poor soils due to agricultural fatigue caused overcropping was common.[80] The introduction and widespread use of compound fertilizers and hybrid seeds in African areas was thus primarily targeted at improving agricultural prospects in these densely populated spaces.

Moreover, investments by the state aimed to curtail the negativity that the NLHA and agrotechnologies had generated over the years. For black and white farmers alike, their early experience with hybrid seeds coincided with a lengthy series of ecological drawbacks, including a massive red locust invasion and extended periods of low rainfall.[81] These challenges intensified rumors that worsened soil infertility was due to the overproduction of alien cash crops.[82] Over time, many shortcomings became apparent with the use fertilizers and hybrids. Their application largely ignores the diverse local flint types that African farmers cultivated on their intercropped farms. Unlike heirloom grain seeds, many felt that hybrid crops did not produce the same savory and nutritional qualities enjoyed by lactating women and used for solemnization in birth, marriage, and circumcision rituals.[83] Meals and opaque beer consumed at various traditional and communal gatherings received unfavorable reviews, leading to declining sales for local breweries.[84] Farmers whose grain was known to be sourced from hybrid seeds or heavily fertilized were tacitly shunned by breweries, which offered better prices for African grain compared to the GMB.[85]

Even agriculturally, there were noticeable differences among farmers who used fertilizer on their crops. For example, in the 1962–3 season, hybrid maize seed planted early in different districts in Manicaland performed well, producing yields occasionally in excess of twenty-five bags per acre and averaging between

79 D. G. Clarke, "Land Inequality and Income Distribution in Rhodesia," *African Studies Review* 18, no.1 (1975): 1–7.

80 Machingaidze, "Agrarian Change," 559.

81 Banda, "Evolution of Zimbabwe' s maize innovation ecosystems," 167–195.

82 Bryan Kauma and Sandra Swart "'Our stomachs are still hungry': The colonial state, African Nutrition and small grains in Southern Rhodesia (Zimbabwe), c.1950 to 1970s," *Critical African Studies* 16, no.2 (2024): 179–199.

83 Melissa Graboyes, "Good food, ridiculous diets, and a well-fed Swahili: British approaches to food in colonial Zanzibari institutions," *Boston University African Studies center Working Paper* 262 (2009): 4–6.

84 Steven J. Hagngade, "Sorghum beer in Botswana: The impact of factory brew on a cottage industry" (PhD diss. *Michigan State University*, 1984), 136.

85 Hagngade, "Sorghum beer in Botswana," 138.

eight and thirteen bags per acre on dry land.[86] During a farm visit by members of the British royal family in 1960, crops on the demonstration plots and Master Farmers' lands looked stellar, showcasing steady growth with dark green and full, plump ears. A crop assessment review conducted by the Department of Agriculture would later show how, between 1965 and 1967, farmers who used chemical "Compound D" fertilizer experienced an increased biomass productivity of between 20 % and 300 % compared to non-fertilized areas.[87] In contrast, crops planted with chemical fertilizers in drier African areas experienced stunted growth due to the dry spell.[88] Something was amiss. In Southern Rhodesia, government support for maize research was not just a commitment to agricultural modernization but part of a larger plan to ensure the economic and social base of white rule. The emphasis on improving hybrid maize production aligned with systematic attempts to undermine African maize production and secure valuable agricultural lands for the settler economy.

These disparities are illustrated in a complaint published in the *Bantu Mirror*, where a disgruntled African corn farmer expressed concern that some agricultural demonstrators, when introducing fertilizers, often failed to account for farmers' vernacular understanding of local ecosystems in their explanations of how fertilizers and hybrid seeds worked.[89] As Machingaidze aptly describes, it was "agrarian change from above," and this reinforced the stifling of African voices within agrarian policy and local development, including in African-dominated spaces. Despite the presence of the Department of Native Affairs and Native Agriculture, these institutions showed little willingness to promote African indigenous knowledge systems in agrarian development. Adding to this, for many African farmers, agricultural information and messaging from agricultural demonstrators, whether it pertained to new techniques, products, or concerns, was often shared by either close neighbors, family, or cordial agricultural extension officers.[90] This created spaces for distortions and misunderstandings. Occasionally, when crops performed poorly, some farmers accused the local agricultural input traders and suppliers of selling them a different product from that sold to farmers in other districts.[91]

86 "Report of the Secretary for Native Agriculture for 1964," NAZ, Box 32986.
87 Mungazi, *Colonial agriculture*, 94 – 95.
88 "Letters to the Editor," *The Bantu Mirror*, February 19, 1961.
89 "Letters to the Editor."
90 Stephen Whitfield, *Adapting to climate uncertainty in African agriculture: Narratives and knowledge politics*, (London: Routledge, 2016), 68.
91 "Letters to the Editor."

However, perhaps the most efficacious advance in agriculture was the introduction of Dichlorodiphenyltrichloroethane (DDT) to support the use of maize hybrid seeds and fertilizers. The entry of DDT onto the Zimbabwean market was a mixed blessing, leading to periods of prosperity and difficulty for agriculturalists. Unlike other fertilizers and chemicals, DDT was advertised as the "Messiah" that would solve pest, soil, and plant insects attacking and destroying farmers' crops.[92] Its potency and efficacy were cost-efficient, especially as it did not require being used in large amounts compared to other pesticides on the market. Various promotional campaigns by the Agriculture Department, as shown in Figure 1, highlighted how combining hybrid seeds, fertilizer, and DDT would allow farmers to predict their harvest, thereby giving them more control over their finances "to spend more without fear."[93] It was prudent for the colonial state to lead DDT campaigns with well-articulated African trainers whose presence would inspire economic and social mobility among the emerging bourgeois African laborers.

Figure 1: Agricultural demonstrators advertising the farmer's pack, which included a variety of maize fertilizers and pesticides, including DDT.

92 Kinkela, *DDT*, 107.

93 "Africans in SR have advanced in agriculture," *The Chronicle,* September 13, 1958.

More quietly, demonstrators raised awareness about the perilous nature of DDT, underlining the need for its limited and careful use.[94] However, many farmers disregarded this cautionary advice. They often maintained their habit of visually gauging measurements when applying chemical fertilizers and pesticides. The sharing and spreading of unclear oral instructions and advice among one another was rampant, as farming was firmly rooted in kinship ties.[95] Little attention was paid to written instructions, worsening these toxin inputs' already dire environmental consequences. In the past, such methods often went without consequence; however, unbeknownst to many, DDT was much more lethal, worsened by its much longer incubation period in the soil, plants, and air. Repeated use resulted in toxic sludge that changed the color of the underground soil and burned the plant from a vibrant green to a rustic yellow with a pungent smell.[96] The agricultural rains no longer filled the air with the refreshing smell of promise. Farmers and consumers alike noticed how even the freshly harvested crops were reproducing a pungent, toxic stench.[97]

From the sixties onwards, the use of chemicals in agriculture became increasingly visible within the local environmental architecture. Rural farmers were gaining access to the various brands of fertilizer and pesticides sold widely in their locales.[98] The combination of hybrid seeds, chemical fertilizers, and pesticides transformed the yields of some plants, including tobacco and cotton. However, as farmers used these toxic chemical innovations, many also fortuitously overlooked how these "sprays stayed in the soil, entering into living organisms, passing from one to another in a chain of poisoning and death."[99] In *The Chronicle*, one African farmer commented that since farmers started using chemical fertilizers, they enjoyed more stable harvests.[100] However, another observed that increasing over-fertilization and pesticide use were causing vivid toxin spills into the river, evident from the greasy multicolored stains on the water surfaces.[101] This contamination affected humans and livestock, which relied on these water sources. Over time, the underground water table also became contaminated, caus-

94 Doro, *Plunder for profit*, 178–180.
95 "Native cultivation: Maize," *Rhodesia Agricultural Journal*, August 1968, 101.
96 "Native cultivation: Maize."
97 "Letters to the Editor."
98 Mungazi, *Colonial agriculture*, 51.
99 Carson, *Silent Spring*, 5.
100 "Peasant production: Fertilizers," *Rhodesia Agricultural Journal*, 1969, 12.
101 "Grain Harvest review," *The Chronicle*, May 11, 1963.

ing various waterborne diseases.[102] Soil fertility was not spared, and as Sergiy Zorya argues, the chemical imbalance of the soil delayed the natural development of crops.[103] As more and more chemicals remained in the soil, this amalgamation killed microorganisms, bugs, and insects that contributed to the fertilizing of the soils and extended plant root life.

Some farmers had developed a habit of mixing different varieties of fertilizer, and while this was manageable for legumes and tobacco, the same was not applicable to cereals, cotton, and other horticultural plants.[104] Furthermore, inconsistencies in hybrid seed, fertilizer, and pesticide use heightened the toxic impact on local landscapes, increasing the occurrence of failed harvests. It was not uncommon for farmers, in attempts to maximize the little inputs (fertilizers, pesticides, or seeds) they had, to experiment with stronger yet toxic varieties such as DDT. It was also common for farmers to either over- or under-dilute liquid or powder fertilizer and pesticide concoctions, hoping to cover more area space or double down on their efficacy.[105] Dosages were never consistent and varied depending on how the farmers felt their crops were performing. Consequently, there was never a clear, transparent, or traceable record of the amounts used, making it increasingly difficult to calculate the efficacy or harm of these substances.[106]

Counterintuitively, this led to an increased, albeit inconsistent, use of these agrochemicals by African farmers. The cross-contamination with different fertilizers and seed varieties resulted in stunted growth, ultimately reducing the quality and value of the crop. Although financial limitations were often the reason for this cross-mixing and inconsistent use, it turned out to be more costly as many farmers failed to achieve even a breakeven return on their investments. Farmers had previously been taught by demonstrators about the advantages of intercropping maize with legumes to help with soil fertility, household nutrition, and food security. Legume crops, for example, could be harvested at least four times at different stages, before the maize was also finally ready for harvesting. Thus, farmers ad-

102 Sergiy Zorya, *Missing Food: The Case of Postharvest Grain Losses in Sub-Saharan Africa, Report No, 60371-AFR* (Washington DC: The International Bank for Reconstruction and Development, 2011), 83.

103 Zorya, *Missing Food*, 78.

104 Kauma, "Small Grains, Small Gains," 260.

105 "Letters to the Editor."

106 Whitfield, *Adapting to climate uncertainty*, 71–72.

versely misinterpreted mixing ideas, which exacerbated the cycle of debt and nutritional challenges faced within African households.[107]

The rush to get Master Farmer or tillage certification from the Department of Agriculture drove many Africans to adopt chemical fertilizers and hybrid seeds, even without adequate information.[108] As the government gradually moved towards relying on African producers, chemical fertilizers, hybrid seeds, and pesticides became increasingly available for sale at private and local general dealers. One Mr. Jacha, a Southern Rhodesia Farmers Union (SRFU) member, expressed joy at how the SRFU and colonial state were progressively working closely together to tackle common farming problems and expand agriculture in white and black areas.[109] The SRFU appreciated its recognition by the state for its role in advancing the use of hybrid seeds to produce the nation's staple.[110] African farmers did not delay and rely on donations or demonstrations from state agricultural demonstrators as they chased certification that would hopefully grant them access to lucrative grain markets.[111] By 1966, it was common practice that state enterprises, including the Cold Storage Commission, Rhodesia Cotton Growers' Association,[112] and Dairibord,[113] would only accept commodities from farmers who were able to provide Master Farmer certificates, which demonstrated that the farmers engaged in regular livestock dipping and followed the guidelines set by the Department of Agriculture for operations. In many ways, access to a Master Farmer certificate enabled Africans to elevate their social and economic status by moving out of the reserves and acquiring land in the purchase area, where commodity grades and prices were more lucrative.[114] In reality, this system perpetuated white settler

107 "Letters to the Editor." Remarks shared by a distraught farmer complaining about how they felt the agricultural demonstrators sabotaged their crop through inadequate explanations on how fertilizers and hybrids operated.

108 B.F. Masell and R.W. Johnson, *African agriculture in Rhodesia: An Econometric study* (Santa Monica, CA: The Rand Corporation, 1966), 79.

109 "Govt move to bail out farmers," *African Weekly*, March 22, 1968.

110 Different *NADA* accounts (in years 1947, 1955 and 1962) suggest that some personnel involved in the development of hybrid SR-52 were part of the SRFU, and they appreciated their work being included in the agrarian trajectory of the colony.

111 Oliver B. Pollak, "Black Farmers and White Politics in Rhodesia," *African Affairs* 74, no.296 (1975): 263–277 Also see Robin Palmer and Neil Parsons, *The roots of rural poverty* (London: Heinemann, 1977).

112 Pius S Nyambara, "The politics of locating the third spinning mill in Southern Rhodesia, 1951–1953," *Historia* 59, no.2 (2014): 46–68.

113 Godfrey Hove and Sandra Swart, "'Dairying Is a White Man' s Industry' : The Dairy Produce Act and the Segregation Debate in Colonial Zimbabwe, c.1920–1937," *Journal of Southern African Studies* 45, no.5 (2019): 911–925.

114 Masell and Johnson, *African agriculture,* 88.

capitalist hegemony as they monopolized the production and distribution of seed and fertilizer, which denied localized food sovereignty.

Mixtures were not limited to fertilizers alone. Heirloom seeds, some from previous harvests, were mixed with hybrid seeds in the same field. After all, communally, seed sharing was a major part of everyday socialization and cohesion, and was also a means of augmenting seed supplies.[115] As noted by Alejendro Ortega and Esbern Friis-Hensen, such seed mixtures merely made seeds more easily susceptible to moisture, molds, and frequent attacks from maggots, weevils, and worms that ate the hearts of the seeds, rendering them useless for cultivation.[116] These concerns extended to postharvest storage as some chemicals, such as *Chirambadura dust* (the colloquial name given to one familiar local brand), sprayed on grain in the silos did not alleviate all the issues related to safekeeping. A significant challenge was that it could remain harmful to humans unless the grain were thoroughly cleaned before milling or consumption. Even then, some families complained about how these various chemicals left a foul odor on the grain, making it unpalatable. The reality was that adopting chemical fertilizers, pesticides, and hybrid seeds was not bringing in the promised lucrative rewards that many farmers anticipated.

"Agriculture is a scam"

The introduction and widespread adoption of fertilizers, pesticides, and hybrid seeds in Southern Rhodesia was heralded as a giant progressive leap towards agrarian control and efforts to produce cheaper food. According to Munyaradzi Mawere and Artwell Nhemachena, Europe looked towards Southern Rhodesia in the years after the Second World War for affordable cash crops, and the use of synthetic pesticides and fertilizers such as DDT held great promise for this purpose.[117] At the time, they firmly believed that they would not harm humans and branded them as "the miracle chemicals" that would spearhead the agricultural and industrial revolution. The long-term consequences meant they became a "weapon of mass destruction, operating from outer atmosphere and destabilizing

115 Friis-Hansen, *Seeds for African Peasants*, 195–196.

116 Alejendro C. Ortega, *Insect Pests of Maize A guide for field identification* (Mexico City: International Maize and Wheat Improvement Center, 1987), 5–10.

117 Munyaradzi Mawere and Artwell Nhemachena, *GMOs, Consumerism and the Global Politics of Biotechnology: Rethinking Food, Bodies and Identities in Africa' s 21st Century* (Bamenda and Buea: Langaa RPCIG, 2017), 4.

agricultural and ecological systems around the world."[118] In Southern Rhodesia, while the use of such agrotechnologies as DDT significantly revived the post-war agrarian economy, it equally led to hazardous chemicalized work environments, crop and land poisoning, exposure of workers to toxic pesticides, and abuse by small-scale farmers.[119] Early warnings, including waterbed stains and pollution, foul air pollution, and changing soil color, were ignored, especially since these innovations targeted unwanted insects such as borer bugs and weevils that attacked plants. Yet, as Carson predicted, society was fast moving towards self-inflicted extinction, with the dystopia of agrochemicals continuing to contaminate the air, rivers, and soils essential for sustaining livelihoods.

By the 1960s, there was a steady boom in the cash crop economy globally. Europe and American markets favored African produce due to its lower prices and qualities. Additionally, the connections between white farmers in Southern Rhodesia and lucrative regional and international markets, economically steered African producers toward both increased use of agrotechnologies and the rigged cash crop economy, where white settler farmers held monopoly and control over the rate, flow, and nature of agrarian production.[120] Unsurprisingly, many African farmers' crops struggled in terms of the number of bags per acre and the quality of the grain harvested. Maize grain from African areas did not have consistent size or color. The Master Farmers observed concerns within the government regarding what they believed to be the continued failure of African farmers to differentiate between the fertilizers required for maize, tobacco, and cotton crops.[121] Each required a different application. However, this paternalistic view overlooked the reality that Africans had limited land, and that their soils were heavily contaminated with years of different fertilizers, which rotated between previously planted crops. Adding to these environmental woes, sustaining maize cultivation was a financial burden. Aisha Mashingauta notes that by the early 1970s, over 11,240 African farmers were deeply in debt to the GMB, owing either stocks in grain, cash, or implements granted on loan through different contracts or drought relief schemes.[122] This situation was worsened by continued low market prices at the GMB for African produce. Maize was not offering the relief many had hoped for.

The quality of cereal grains was measured and associated with their kernel number. That is, each seed's average size and weight determined its quality.

118 Mawere and Nhemachena, *GMOs, Consumerism*, 35.
119 Doro, *Profit and Plunder*, 2
120 Kauma, "Small grains, small gains," 271.
121 Masters, *Government and agriculture*, 81.
122 Mashingauta, "Power and Hunger," 479.

Using this method, plant and food scientists could calculate and estimate the nutritional value, length of life, and plant value among other determinants. In stark contrast, Peter Ndege,[123] and Mazarire,[124] observe that African agricultural practice was a testament to their shared intimacy with their environment, spirituality, and indigenous knowledge. Indeed, black farmers held the intellectual wherewithal to troubleshoot and address some of the issues that arose within their environments. For example, from observing the presence of certain insects and birds, farmers could almost accurately forecast rainfall potential. Equally, during planting, some farmers could estimate their harvest by analyzing the humidity and texture of the soil or the color and size of their plants during the planting season.[125] However, this experience was altered with hybrid seeds and chemically fertilized soils, as they introduced an unfamiliar growth pattern. For instance, farmers knew that their maize crops were ready for harvesting once they reached a peak of two meters high, with cobs maturing after about twelve weeks. However, hybrid seeds cut this time by almost half, while never growing to full length.

In some cases, the maize stock would remain a dark green, which was understood as not being ready for harvesting (*haina kuibva*). Moreover, the kernel count varied widely according to temperature, soil type, soil and ground precipitation, rain type and amount, seed type, and the fertilizer applied along with its quantities. It was a zero-sum game for African farmers fraught with more challenges than solutions. These agrotechnologies became increasingly political as they thwarted social and cultural rituals such as rainmaking, practices that served as established means of gatekeeping, and maintaining power and control over agrarian economies by a select few elites. With hopes and dreams shattered, "agriculture was a scam" for many African farmers.[126]

123 Peter Ndege, "Wheat: Why grain was heavily protected by colonial authorities," Nation, January 10, 2020, accessed September 19, 2024, https://nation.africa/kenya/business/seeds-of-gold/wheat-why-grain-was-heavily-protected-by-colonial-authorities-239734.

124 Gerald Mazarire, "'The politics of the womb': Women, politics and the environment in precolonial Chivi, Southern Zimbabwe, c.1840 to 1900," *Zambezia*, 30, no.1 (2023): 35–50.

125 Tavuyanago, "Traditional Grain Crops," 6.

126 Valerie Rumbidzai Jeche, "Corruption in Zimbabwe: The Command Agriculture Scandal," Future Africa, accessed December 12, 2024, https://futureafrica.net/corruption-in-zimbabwe-the-command-agriculture-scandal/.

Conclusion

The history of agrotechnologies in Southern Rhodesia is about power, indigeneity, and control. This chapter explored African grain farmers' experiences with agro-innovations, notably hybrid seeds, chemical fertilizers, and pesticides, over the colonial period between the 1920s and 1970s in Southern Rhodesia, now Zimbabwe. It reflects on the complex relationship between power, ecology, and culture in Southern Rhodesia. It revisits conversations on agrarian development to show how agro-innovations had a differential impact on African agrarian and cultural systems.

From their inception, the use of fertilizers and hybrid seeds involved a combination of both facts and emotion. Farmers were told that their use would improve their social and economic well-being, illustrated with vivid images of improved social mobility. However, owing to strained finances, improper mixtures by farmers were rife, which adversely impacted crop growth and the (toxic) nutrient balance within the soil and environment. Although the colonial state had its own ideas for solving Africa's agrarian and food problems, these problems had a long history, embedded in a combination of different cultural and environmental ideas on food production and preservation. Black farmers in Zimbabwe had a broader understanding of seeds, soil, and agriculture that the colonial state failed to grasp. However, this seemed to be under siege from the widespread introduction of various agrotechnologies. Food production systems became increasingly industrialized and exploitative, revealing deep-seated racial injustices affecting African livelihoods that stemmed from years of colonization. Additionally, poor agricultural choices made by farmers and policymakers worsened the poverty and nutrition traps throughout society. The use of agricultural technologies in the development of African peasant agriculture was contentious, as these innovations were closely linked to the politics of race and inequality during the colonial period.