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Citrus Global Production Network in Western Cape, RSA: Strengthening of Established Commercial Farming by Bypassing Water Reforms

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ABSTRACT: In the Republic of South Africa (RSA), reforms to existing and new water allocations have been aimed mainly at redressing the racial injustice of the past. Such reforms, however, have failed to materialise in the citrus-producing region of the Western Cape. This paper argues that the emergence of a strong Global Production Network (GPN) of citrus export at the time of rolling out of the water reforms has contributed, and continues to do so, to the failure of these reforms. The high quality and quantity requirements imposed by the GPN, we argue, necessitated the use of precision fertigation, which acted as an entry barrier to Western Cape citrus products. With access to specialised precision fertigation networks, the landed (white) commercial farmers were able to forge long-lasting relationships of trust and quality with the retailers of the citrus GPN and thus gain and maintain privileged access to it. Their strong position in the citrus GPN enabled three strategies of new water access to emerge, that are exclusively available to the established (white) commercial farmers, namely: (1) using water illicitly; (2) attaining a controlling stake in Black Economic Empowerment (BEE) partnerships; and (3) through access to the network of water consultants. New water access consolidates existing positions of growers in the GPN, making the position in the GPN and water expansion a mutually reinforcing phenomena. High GPN entry barriers have advantaged established commercial farmers and effectively impeded the intended introduction of more equitable water reforms in the region.

KEYWORDS: Precision agriculture, precision fertigation, water reforms, global production networks, entry barriers, technology, network, market access, citrus, South Africa

INTRODUCTION

An important goal of South Africa's 1998 National Water Act (Funke et al., 2007) was to redress racial injustices in water access, a goal that till now has not been achieved. Lack of institutional coordination has been blamed for the initial failure of land and water reforms (Ncube, 2018). Rawlins (2019) and

Debbané (2013) have shown how the 'willing seller, willing buyer' policy of voluntary land (re)distribution has failed to bring about significant results (Lahiff, 2007). By 2009, only 4% of land had been transferred (de Jager, 2009). With slow movement on land redistribution, the allocation of new water to farmers who were designated Historically Disadvantaged Individuals (HDIs) was also stalled. For the Western Cape province, as explained by Debbané (2013), the Department of Water and Sanitation (DWS) did not have enough emerging HDI farmers to whom new water could be allocated. In response to these failures, the Broad-Based Black Economic Empowerment (B-BBEE) Act of 2003 was adopted by the DWS to revamp the reform goals enacted in its 1998 Water Act (Movik, 2014; Schreiner et al., 2004). Established white commercial farmers, to become eligible for new water allocations, were required by this Act to enter into some form of partnership with HDI farmers that would bring the latter economic benefits and develop their skills (Debbané, 2013; Rawlins, 2019). Reforms were also introduced to the historically white-dominated irrigation boards by transforming them into Water Users Associations (WUA) that were required to have an assured representation of HDIs on their management boards. However, as argued by Kemerink et al. (2012) on the basis of their case study in the Thukela River basin, the representation of HDIs remains elusive as they struggle to find any real voice in the still white-dominated WUAs.

Overall, these studies point towards local practices and power relations within WUAs, lack of institutional capacity and coordination between the DWS and the Department of Agriculture, Land Reform and Rural Development (DALRRD), and white farmers being a historically organised group around water in irrigation boards, that all lead to the abysmal progress of water reforms in South Africa (Méndez-Barrientos et al., 2018). The studies explain the failure of water reforms (and more specifically the failure of water reallocations) by analysing the institutional and historic factors focusing on land and water. As argued in this paper, however, additional explanation is required if one is to understand why new water allocations keep ending up in the hands of established white commercial farmers.

This gap is filled by an analysis of the Global Production Network (GPN) offered by Gibson and Warren (2016a) and Smith (2001). This paper, taking the case of a citrus-producing area in Western Cape (referred to henceforth as the 'Citrus Region'),[1] shows how the emergence of the GPN has played a central role in reinforcing the position of the established, landed, white citrus growers. It demonstrates that, while the GPN has high entry barriers in terms of quality and quantity, white commercial growers have turned these barriers to their advantage by having access to two key material resources of citrus production: water and precision fertigation technology. As we show in the paper, access to these two key resources exists by virtue of their position in the citrus GPN and not irrespective of it. Based on our analysis, we contend that the strong and established citrus GPN and the dominant position of white commercial farmers in this network has thwarted, and continues to thwart, the state's efforts at water reforms in the area.

As GPN analysis tends to pay little attention to issues around land and water and to assume that irrigation and other technologies are 'neutral' in their effect, this paper contributes to GPN analysis as well.

The paper is based on a literature review and field study. For this research, semi-structured interviews were conducted by the first author between January and April, 2023, with citrus GPN actors who are embedded in the Citrus Region. It included interviews with citrus growers (7), aspiring HDI farmers (5), DWS officials (5), technology and knowledge consultants (5), exporters (4), and marketeers (4) all of whom are dealing with export citrus produced in the region.

The structure of the paper is as follows. In Section 2, we discuss the tenets of Global Production Network (GPN) theory to provide an analytical framework for our analysis. Section 3 presents the historic evolution of the citrus GPN, its current practices and entry barriers, and the position of RSA's Citrus Region in it; this is based on the existing literature and on our own results. This is followed, in Section 4,

[1] To protect the identity of the people involved in this study, we have not revealed the exact location of the citrus-producing region in Western Cape where the fieldwork was conducted. For the remainder of the paper, we thus refer to our study area as the 'Citrus Region'.

by a focus on access to precision fertigation and water. We explain how precision agriculture has enabled commercial farmers to gain and maintain a strong position in the GPN and how it opens a new arena of exclusion for HDIs. Section 5 presents and analyses three strategies through which white farmers have leveraged their position in the GPN to their advantage in accessing new water; these strategies are: illicit uptake of new water on expanding farmland in the name of employment creation; holding a controlling stake in the government's Black Economic Empowerment partnership programme and continued exclusion of HDIs from the white-collar network. Section 6 presents the paper's conclusion that successful water reform in the Citrus Region and similar areas would require attention to broader agrarian reforms.

GLOBAL PRODUCTION NETWORK APPROACH

The GPN approach, essentially, attempts to explain geographically uneven patterns of development, that is, the emergence of regional economies that become a node of either production or consumption in a global network (Smith, 2001). This approach thus queries how certain subnational regions are enrolled in production networks and what binds these spaces into a particular economic activity. While the production network is global in nature, it is also embedded in certain localities that act as the 'production engine' for these networks (Gibson and Warren, 2016a). As elaborated below, this is the case for RSA's Citrus Region, which has emerged as a major production node in the citrus GPN that exports mainly to US and EU markets. With such a conceptualisation of a locally embedded citrus GPN comes the question of what makes these GPNs embed in certain localities and what determines the access of local actors to them.

Early GPN literature, in order to explain the emergence and embeddedness of GPNs, focused on relationships between firms, on the power dynamics within these relationships, and on the private governance practices in place between firms (Gibson and Warren, 2016b). In GPN theory, the private governance practices around aspects such as quality regulation and relationships between actors then determine who gets to participate in the GPN (Alford and Phillips, 2018). The entry barriers enacted by certain actors can thus determine the shape and nature of the emerging GPNs (Werner, 2016). The focus on the role of lead firms and inter-firm relationships, however, came at the expense of neglecting the role of biophysical resources in the emergence of locally embedded GPNs (Gibson and Warren, 2016b). This critique held true for the natural-resource – facing production sectors such as energy and agriculture, where actors of the GPN contested access to, and control over, these resources in their locality, thus creating "sites of contestation" within the GPN (Kleibert et al., 2020). This critique raised the question of materiality in GPNs. In the production of natural resource–dependent commodities, the production network acquires its spatial and network properties from the variability in biophysical resources and the ability of actors to access and transform these resources into the commodity (Bridge and Bradshaw, 2017). In our conceptualisation of the citrus GPN, we take the spatial property of the GPN (the emergence of a regional citrus economy in the Citrus Region) as an entry point and analyse the underlying processes and relationships of access to material resources (water and precision fertigation) that, in turn, shape access to the GPN.

We define access as the "ability to benefit from things" (Ribot and Peluso, 2003). The ability to benefit from resources is determined by the relative position of the actors in the network and is thus seen as an effect of the network's properties (Tienstra and Roth, 2013). Access is, in other words, relational, meaning that the ability to benefit from material resources is often contingent on securing critical relations and other connected resources.

Here, we pay explicit attention to the role of technologies in shaping GPNs as a way to recognise issues of relational access to the technology and to the associated knowledge networks that are rooted in the wider local sociopolitical circumstances. This further elaborates on the existing critique of the role of technologies in GPN literature, which sees technology as a mere background element that maintains the network rather than shaping it (Foster and Graham, 2017; Henderson et al., 2002). In our analysis of the

citrus GPN, we expand the conceptualisation of materiality in GPN literature to include the role of technologies that are key to shaping the GPN. Precision fertigation technologies for citrus production are thus seen as a shaping element of the GPN. By enabling growers to meet the quality and quantity standards (or entry barriers) set by retailers, these technologies play a crucial role in embedding the growers in the GPN. Access to these technologies is also just as contested as access to water and thus shapes who gets to participate in the GPN.

EVOLUTION OF THE CITRUS GPN AND THE CITRUS REGION

The Citrus Region of RSA's Western Cape is comprised of a small town surrounded by citrus farms. Its extensive orchard plantations, numerous packhouses, exporters, marketeers, agricultural inputs, technology and knowledge companies are all geared towards citrus production. With almost all the citrus growers targetting export, the Citrus Region has established itself as a major node of production in the citrus GPN in terms of volume and quality.

The GPN, with its focus on high quality citrus production, has emerged mainly in the post-apartheid era, which coincided with the liberalisation of national and global markets. During the apartheid regime, citrus production was organised under the single-desk export system of the citrus export board, OUTSPAN. Under this system, farmers were encouraged to produce high volumes and did not compete on quality. It also meant that farmers chose cultivars on the basis of their yields rather than on their attractiveness to overseas buyers. In1996, with the ending of apartheid-era, international trade boycotts and with national and global market liberalisation, the single-desk export system was abolished. The subsequent years were marked by a period of adaptation for citrus growers; they had to forge new relationships for continuation of their exports and to align with the market by adopting the industry standards set by retailers (Mather and Greenberg, 2003). In the post-liberalisation era, the participation of white commercial farmers in the citrus GPN has come to be predicated on moving up the supply chain and establishing closer personal relationships with retailers. It also relies on consistently producing market-compliant quality and quantity and on staying price-competitive in the global market while retaining slim profit margins. Getting the pricing, quality and quantity right over the years has thus been a prerequisite for establishing trust, reputation, and good relationships within the GPN. The following quotes from commercial farmers are indicative of these practices:

> If we miss out one year, it's not just a financial thing. It's an image thing and you're not gonna get back into that supermarket because we are directly involved (Commercial Grower Y, personal communication, 31 March 2023).

> Now we have for 10 years the same person visiting us. He knows the family and the relationship is very different. It fits our model. They love seeing all the social projects, schools etc. and they want to understand what kind of supplier are we, rather than just getting down to business. Not just in terms of quality but they want to know us (Commercial Grower X, personal communication, 15 February 2023).

Commercial farmers had to begin competing with growers around the world on quality and pricing (Mather and Greenberg, 2003). The current citrus GPN is extremely competitive and has high entry barriers for all existing and prospective new growers. To overcome all these challenges precision fertigation has become a key production technology and thus constitutes another entry barrier to the citrus market. Precision fertigation allows the farmer to inject the correct dose of fertiliser into the on-farm irrigation infrastructure in order to ensure the optimal nutrient supply at the right moment and hence steer crop development.[2] It ensures that farmers are able to harvest good quality citrus in quantities – and on a timeline – that fulfils their contracts with retailers. It also allows them to optimise

[2] By applying precise amounts of fertiliser and water for each orchard block at different growth stages, farmers can influence factors such as the size, colour, flavour and rind (Yu et al., 2023).

production by managing sub-plot variability and input costs, thus staying price competitive. Precision fertigation also helps citrus farmers manage variations in weather and soil conditions, thus ensuring consistency in their year-on-year production quality and quantity. Installation of precision fertigation technologies have thus become an obligatory point of passage in maintaining and strengthening access to the citrus GPN. The obligatory nature of precision fertigation technologies was evident from what white commercial farmers expressed in interviews, all of whom were using precision fertigation technologies to gain and maintain access to the GPN.

> So, yes we have to make sure that our product matches the contract regardless of drought or weather conditions here. So, we do everything to make sure that we supply what we agreed on regardless of the conditions (Commercial Grower X, personal communication, 15 February 2023).

> So when we know what the market wants then we try tweaking it more towards the right colour or right size more and more (Commercial Grower Y, personal communication, 31 March 2023).

These quotes highlight that in the cut-throat environment of the citrus GPN, where a loss of relationship with a retailer due to a missed quality target can be permanent, growers must use precision fertigation technology to manipulate (tweak) plant growth to meet market standards.

The most commonly used precision fertigation technologies used in Citrus region are drip and micro-sprinkler irrigation systems. These irrigation technologies are supported by NDVI maps[3], soil and leaf analyses, and by soil probes and continuous real-time monitoring of fields at the sub-plot level to ensure the optimal application of water and fertilisers. A bundle of technologies and knowledge expertise must thus come together to develop optimal fertigation schedules for each citrus cultivar at the sub-plot level. To ensure this, all commercial farmers work closely with technology consultants and input suppliers, and they create full-time positions for technical staff on their farms for application of precision fertigation. The integration of the Citrus Region in the citrus GPN has thus seen the emergence of a localised technology, knowledge and input supply network that enables the use of precision fertigation in citrus production; this, in turn, enables commercial farmers to have continued access to, and maintain compliance with, the international high quality, high value export market. Gaining access to this network and to service providers has become a prerequisite for gaining access to the market.

In the citrus GPN, however, it is no longer enough to compete on price, quality and quantity. Capital accumulation and the need to expand is a well-recognised feature of globalised and commercial agriculture. In line with this trend, the established (white) commercial farmers of the GPN feel pressure to expand because of diminishing profit margins. According to the WUA of the Citrus Region,

> [i]t's just a bad cycle. Every year your cost goes up for farming. Since Covid and Russian war the things are really bad. There are things farmers have to get for farming went up double or triple in price. Now what happens is he's got to expand, to make his profit again (Water Users Association member, personal communication, 14 February 2023).

Such expansions often (but not always)[4] require access to new water, which has thus become another key factor in gaining and maintaining access to citrus GPNs.

We proceed to discuss access relations to precision fertigation technology and to new water, respectively.

[3] Normalized Difference Vegetation Index (NDVI) is a remote sensing-based method that allows growers to see the vegetation amount and health, based on which they can adjust their inputs to specific areas in the field.

[4] Growers can expand even with the existing available water, for instance by producing the same amount and quality of citrus with less water; they can then use freed-up water for new orchards or can increase the quality and quantity of citrus from their existing orchards by improving production efficiency.

ACCESS TO PRECISION FERTIGATION TECHNOLOGIES

To make precision fertigation work, a bundle of knowledge, software and hardware expertise must come together. The Citrus Region has the network of precision fertigation experts that is needed to sustain this technology; it includes agronomists, farm managers, irrigation experts, hardware suppliers, soil scientists, input suppliers and software managers. For farmers using precision fertigation to participate in the citrus GPN, access to this local network is crucial.

In the Citrus Region, access to this network has come to be divided along racial lines. The white Afrikaner landed elite of Western Cape have moved into both upstream and downstream farm supply chains (Genis, 2015), embedding themselves firmly in the precision fertigation network. In our interviews with technology and knowledge consultants, we found that all of the actors in the precision fertigation network shared four common characteristics, they were white, Afrikaans-speaking, and university-educated (many at University of Stellenbosch), and most also had strong rural connections such as being from a landed family. They are thus part of a robust social and racial group that is embedded in the racial history of Western Cape.

Historically, the landed white Afrikaner elite of Western Cape has been a socially and politically cohesive group that has worked collectively for the supremacy of white commercial farming (Giliomee, 1987). This has included lobbying the state for privileged access to natural and capital resources and setting up research and development capacities for agricultural extension. Scientific advancement, particularly in the field of agriculture, was the glue that held white South Africa together; it even transcended Anglo – Afrikaans divides (Dubow, 2006). As early as the 1950s, SA Cooperative Citrus Exchange (SACCE) – the predecessor of OUTSPAN – had established its research unit and was awarding bursaries to agricultural students for advanced research on citrus farming (Grout, 2012). Under the apartheid, these extension facilities and opportunities for R&D were available only to whites. Historically, entrance to the technology and knowledge network has thus been determined by social and racial identity, excluding all those who did not fit the criteria. This continues to hold true today, in that the network of precision fertigation is dominated by white knowledge and technology experts and is closed to outsiders who do not belong to the same social and racial group. The preferential access of white commercial growers to the precision fertigation technology network solidifies their position with respect to retailers by enabling them to consistently supply high quality and quantity produce, thus establishing their reputation as trustworthy suppliers. This creates further entry barriers to the few black and coloured aspiring farmers in the area who may wish to enter the citrus market. As an aspiring black farmer described his experience of interacting with the network:

> I was going to Citrus Region and I could see that these guys are not willing to help me. That is why I had to go to town-x because at least that guy was willing to give me a fertiliser program. But here if I go to them, they don't see me. They say I am small. They don't recognise you. They don't want to give you opportunity. Sometimes X (chemical supplier) gave me poison on credit. But here if I ask in Citrus region, they say no (Emerging Farmer, personal communication, 23 March 2023).

A white agronomist in the area who mentors an emerging black farmer explained that HDIs are often unable to obtain inputs at competitive market prices and thus face higher costs than white commercial farmers.

> Chemical persons charged the highest price possible. Because this bloke has not learned how to bargain. So he just takes the first one and says fine. This bloke when I got into business with him and started to be a mentor, his chemical program was 13,000 rand per ha. When I took over, I said listen now you get tenders. There are 14 chemical persons. Everyone must give a price. The same person who charged him 13,000 rand got the tender. Same job for 6,000 rand per ha. The only thing why he kept his price right is he knew I was looking over this bloke's shoulder. That's the main problem with beginner farmers (Agronomist, personal communication, 16 February 2023).

It is worthwhile noting here that the precision fertigation network has significantly developed itself during the post-apartheid era in response to GPN practices, yet it continues to be a predominantly white space. With precision fertigation technologies functioning as an obligatory point of passage to the citrus GPN, the new precision fertigation network has become an additional site of exclusion for any new entrants and reinforces the historic inequality in access to knowledge and technology.

ACCESS TO WATER: INTERFACE WITH WATER REFORM

Over the last two decades, white-owned citrus farming has continuously been expanding the area under cultivation, as well as its water access. According to figures from Western Cape's Department of Agriculture, it is estimated that the area under citrus plantations has expanded by 19% per annum over the five years since 2014 (Western Cape Government, 2021). This expansion of white commercial farms requires water access that is constrained by regulation. Under the 1998 Water Act, white commercial farmers are not supposed to obtain new water rights; they can, however, retain their existing lawful water use (ELU), subject to conditions. Since 2003, they are also required to undergo processes of validation and verification (Kapangaziwiri et al., 2018).[5] Under the 1998 Water Act, water reforms allow preferential allocation of new water[6] to HDIs through a water-licensing procedure that aims to redress the historic inequality in access between white and black individuals.

We found that three key strategies were being used by white commercial growers to access new water. They are: (1) illicitly accessing water; (2) acquiring a controlling stake in the BEE partnerships; 3) obtaining access to new water through the white-collar network of accountants, lawyers and water consultants. As we will demonstrate here, however, these strategies are conditional on pre-existing access to land, water and the citrus GPN. We argue that the citrus GPN, through conditionality of access, both requires and enables white growers to acquire new water for expansion.

Getting away with illicit water use

Growers in the Citrus Region turn to illicit water use because of water scarcity and the pressures of expansion and maintaining access to the citrus GPN. Illicit access to water usually means obtaining water for irrigation through an unauthorised source. This can include direct pumping from the river or borehole, unauthorised storage of legal or illegal water in private dams, or acquiring more water than authorised during imposed summer restrictions. This illicit access to water does not imply total lawlessness, but rather limited overuse and the unofficial appropriation of a water licence or an ELU. Due to annual variation in water availability, water use is restricted in dry years and growers may use only a percentage of their authorised water concession. However, since growers pay for the total water allocated in the water authorisation and not for the restricted 'dry year' concession (which may vary from year to year and is lower than the water authorisation), they often aim to secure their authorised ('normal') water concession anyway from unauthorised sources (Commercial Grower Z, personal communication, 15 February 2023) or through unauthorised storage (Department of Water and Sanitation, personal communication, 15 March 2023). As is evident from these strategies, illicit access hinges on the non-restricting of either ELU or water licences in dry years. Méndez-Barrientos et al. (2018) have highlighted this process of claiming and appropriating what is perceived by white citrus farmers as "rightfully theirs" as the claiming of their "paper right".

[5] Existing lawful use (ELU) and its validation and verification are for water users with water rights during the qualifying period (two years prior to 1998 Water Act). Water licences are for water uses that were authorised after 1998 and under the new Water Act. For more details, see the guide to verification of water user by SA's department of water and sanitation.

[6] In this section, water authorisation refers to the amount of water that is legally allocated to a farm or farmer either through an ELU or a water license.

To benefit from this appropriated water, growers need access to land and to the citrus market. As it happens, established (white) commercial farmers – due to their historic privileged access to land – usually already own land that is not yet under irrigation. This land is thus brought under citrus plantation, which is then supplied through their existing access to the citrus GPN. It is also particularly important to have land and the relationship with the citrus market in place before accessing any illicit water, as it justifies any prospective future fines or court cases that DWS might bring against farmers. While growers may risk facing hefty future fines, in the meantime they continue to profit from orchard expansion. A commercial grower described the situation of illicit access as being aware of possible consequences but continuing nonetheless:

> I would love to comply. But how do I do that? At a certain point, you do what you have to do (Commercial Grower Z, personal communication, 15 February 2023).
>
> They [the DWS] will probably come and sue me one of these days (Commercial Grower Z, personal communication, 15 February 2023).
>
> But I have never come across a farmer who is telling me that they have long term consequences because of water. It's because they just continue using the water. Because they just need it. What are their options? (Consultant X, personal communication, 12 February 2023).

Moreover, by using illicit water access for expansion of citrus plantations, white commercial growers are able to connect their water use with job creation. With the creation of jobs that comes with a successful orchard, taking back any illegal water access becomes politically and administratively difficult for the DWS. Growers at that point have both financial resources to fight legal battles with the DWS and an economic justification narrative of job creation for the rural poor. This was evident from various interviews with water consultants who submit applications for water licences to the DWS on behalf of farmers, WUA, DWS and farmers.

> I was with a farmer and Scorpion[7] came to his farm and at the dam. Scorpion said that this is the second time you do something illegally and you know we can call in bulldozers and close your dam. He said yes then you also bring a couple of buses to fetch all the people that earn money from this farm because I can't keep them (Water Users Association member, personal communication, 14 February 2023).
>
> They keep saying that if you close us then you close down the economy, people lose the job. We don't shut down anyone. We try to help them and allow people in non-compliance to comply to protect jobs (Department of Water and Sanitation official, personal communication, 15 March 2023).

These findings are in line with Lanari et al. (2021), who identified the economic justification narrative as a strategy used by farmers to shift the focus away from their illicit water use and influence policy discussion around water allocations. The ability of established (white) commercial growers to benefit from their illicit water access (financially and in terms of policy) is conditioned upon their access to land and to the citrus GPN. This allows us to further our argument that illicit water access is an option that is available only to the Citrus Region's white commercial growers. As established growers have strong relationships with retailers in lucrative markets enabling profitable farming operations which provides the financial means to fund, maintain and benefit from their illicit water access. This continued appropriation of illicit water also diminishes the water resource base available to authorities for reallocation to emerging HDIs.

[7] Scorpions is a team in DWS that is responsible for enforcement of water and sanitations laws and regulations.

Acquiring a controlling stake in the creation of BEE

The second strategy of white citrus growers for accessing new water licences is through BEE partnerships. Similar to illicit water access, the position of citrus growers in the GPN and access to resources such as land and technology is crucial for transforming BEE-based access to water into a successful farming operation. This relational access becomes the ground for enforcing new and old racial inequalities in water access and subsequently in access to the GPN. Below, we briefly explain the nature of BEE partnerships in the Citrus Region, and then demonstrate the role of the citrus GPN in facilitating water access through BEE partnerships.

In the absence of HDI farmers, the DWS has adopted the BEE policy of allocating new water rights or new water storage rights to commercial farmers only if they can demonstrate that the benefits obtained from new water will be shared with HDIs. The benefit-sharing mechanism can differ, resulting in various models of BEE partnerships. Often farmers put their existing land, without water rights, in a trust where half of the land belongs to the white commercial farmer and the other half must be owned by HDIs. For such partnerships, a group of HDIs jointly purchase 50% of the land through money grants provided by the DALRRD. This usually results in each HDI owning 1 or 2 hectares of land. The BEE partnership can then apply for new water through a water-licencing procedure, with water licenses often being granted to the HDI component of the partnership (Department of Water and Sanitation official, personal communication, 9 February 2023). In other BEE partnership models, the farmer retains 100% ownership of the land but creates a trust/equity scheme that operates the farm; in that equity scheme, HDIs become 50% partner and the scheme can then acquire new water. Yet another BEE partnership model found in the area involves land distribution; white farmers sell their land to the Department of Land and Rural Development, which buys it under a 'willing seller, willing buyer' model (Lahiff, 2007). This land is then allocated to a pre-identified group of workers, often those working on the same farm but on a different piece of land. Water rights can then be acquired for this piece of land, for which workers now hold 100% ownership. White commercial farmers then acquire the role of mentor, for which they are paid by grants from DALLRD. Commercial farmers who use their own machinery, packing sheds and other infrastructure facilities for production, deduct fees for these services from the profits made by the farm, and the remaining profits are distributed among the HDIs.

In all these models of BEE partnership for access to new water, yet again, the access is contingent on a bundle of powers and relations held by white commercial farmers. First, access to water through BEE partnerships requires pre-existing access to land which is exclusively in the hands of the established (white) farmers. Second, it requires that white farmers have the means necessary for establishing a successful orchard operation through which they and their HDI partners can benefit. This requires investments in infrastructure, farming equipment and technologies, established relationships with input suppliers and knowledge experts, and a strong position in the citrus GPN. While HDI partners may hold water, land or equity (shares) rights in the BEE partnership, and thus may theoretically also participate in the citrus GPN through those rights, the farming operation relies on, and is run by, white commercial farmers' existing network of citrus production. Despite being in a partnership, BEE partners thus still have no individual access to the white farmers' network. Third, commercial farmers need market access for their product and BEE partnerships give additional advantage to citrus producers by allowing for ethical marketing of citrus produced by them.

> When food is on the international market, and they are known as company who has BEE. Now they will get preference by selling on international market. That is the main reason behind this partnership. To benefit them. Not to benefit workers (Citrus Region municipality official, personal communication, 21 March 2023).

BEE partnerships also introduce new avenues for racial inequality by benefiting white commercial farmers at the expense of their HDI partners. This is due to large power differences between the white and HDI members of BEE partnership. HDI partners have often been farm dwellers for multiple generations, and their relationships with the white farmers are often notoriously characterised by "racialised paternalism"

(du Toit, 1998). Historically, to be a farm dweller was not to be merely an employee but also to be 'under the care of' the white farmer who exerted a large degree of control over their labour. Some had hoped that BEE partnerships would lead to these old relationships of power being replaced by business relationships; however, these partnerships have become a window-dressed component of the citrus GPN while power imbalance and racial inequality remain their ordering elements (du Toit, 1998; du Toit et al., 2008). Such power differences between white and HDI partners have led to widespread cases of 'water fronting' where the HDI component of a BEE partnership is used as a front to access new water licences without HDIs reaping any rightful upskilling or monetary benefits from the partnership. As the DWS described one such extreme case,

> This is the case of water fronting. X is black. He didn't even know that he has a water licence to his name. He was shocked when we came (Department of Water and Sanitation official, personal communication, 15 March 2023).

Even when HDIs are aware of the rights that accompany a partnership of which they are a member, this does not necessarily translate into benefits. As a retired farm dweller in a BEE partnership described his experience,

> They had water rights and they applied for more rights and they were building a dam. So farm-x was building a dam that supplies those xx ha. They had applied for a licence. Name-x is the company that was established. They are using that company to apply for new water. There was no oranges on this piece of land. So they had to apply for new water. The owner is dead now. I was there. Problem is I finished my job, and I had to request where my dividend was (BEE Partner, personal communication, 21 March 2023).

This farm dweller, with help from the Citrus Region municipality, is trying to raise the issue of not receiving monetary benefits from the BEE partnership. The municipal official described the situation thus:

> But now he needs to appoint a lawyer. And that costs money. They can't hire accountant and lawyers. White farmers use their own accountants and they run the books (Citrus Region municipality official, personal communication, 21 March 2023).

Such incidences show that BEE partnerships are a far cry from upskilling of HDIs for better operation of commercial farms. Access to the GPN through BEE partnerships is thus highly problematic. It not only provides established (white) commercial farmers with access to water and thereby improved access in the GPN; it also provides them with marketing benefits. At the same time, these partnerships, because of being rooted in historical power imbalances between farm owners and farm workers, lead to new avenues of exploitation of farm workers, as white farmers reap benefits from the GPN at the expense of the farm workers in the partnership. Various authors have expressed concerns about the exploitative nature of BEE partnerships in other sectors. Debbané (2013), for instance, describes a partnership between white growers and farm workers that aimed to access cheap state capital for construction of a new dam, while du Toit et al. (2008) and Raynolds and Ngcwangu (2010) have shown how the branding benefits of BEE partnerships are reaped by white commercial growers in wine and rooibos production.

Access to the white-collar water experts network

Last, the access to new water and establishment of BEE partnerships requires access to the network of water consultants, lawyers and experts. For a commercial grower to make an application for accessing new water, such as groundwater use authorisation, the grower will need to hire at least a hydrogeologist and a water-licensing consultant to prepare the technical feasibility report and deal with the legal and administrative aspects of the water use application. Moreover, if the farmer is planning to access the new water right through a BEE model, such as an equity scheme, they will need to establish an operating company associated with the farm, enter into agreements with HDIs, and demonstrate benefit to the HDI component of the partnership. This requires working with accountants, lawyers, water consultants and

other members of white-collar services. This network, in its spatial characteristic, is different from the precision technology and agrarian knowledge network in that it is more urban based, with most consultants based in Cape Town; however, this network is similar in its racial characteristics, with most water consultants, lawyers and technical experts being white. Some of the prominent water-licencing consultants who represent the majority of white growers in the Citrus Region are former white employees of the DWS who left the organisation due to its policy of promoting black and coloured employees in order to introduce diversity into the ranks of what was formerly a white-dominated government department. The DWS has accused this network of harbouring sympathies for white commercial farmers due to its policy of restricting access to new water resources. As stated by one DWS official,

> In water field, they know they are not supposed to get water anymore. So they protect each other more (Department of Water and Sanitation Official, personal communication, 15 March 2023)

Further reflecting on the emotional politics that is experienced within the DWS, where employees of the department seem wary of its former white employees (now consultants) who engaged in racially biased water-licensing policies when DWS was a white majority department, one official commented that,

> white people back in the day, they sorted out their people first. And they didn't consider black people. Now that we are here we don't consider them as much (Department of Water and Sanitation Official, personal communication, 15 March 2023).

These quotes from a DWS employee touch on the emotional politics of not just the DWS but of the wider South Africa, where whites are still perceived as forging alliances to protect their economic and social privileges (Steyn, 2005). While such politics of identity and formation of culturally and racially homogenous groups is not a central focus of this research, we take our cue from the extensive research on this topic (Adams et al., 2018; Cornelissen and Horstmeier, 2002) that highlights the tendency of whites to simply 'stick together'. By placing the white water network in the context of a post-apartheid society that is still divided along racial lines, we conclude that the water network remains inaccessible to HDIs due to its underlying racial and economic logics. This, in turn, means that white commercial farmers can benefit disproportionately from the network of water access, which results in the strengthening of their privileged access to, and position within the citrus GPN.

DISCUSSION AND CONCLUSION

In this paper, our main aim has been to demonstrate the role of the citrus GPN in consolidating and expanding the white landed elite at the time of water and land reforms that were supposed to support the inclusion of HDIs. We demonstrated this in a two-step analysis of the citrus GPN and its conditions of participation (entry barriers) and the subsequent reinforcing of white commercial farmers in their dominant access to water. By uncovering the changes in network practices in the citrus GPN, and the personal and long-term relationships between retailers and growers that are based on continuous fulfilment of the quality and quantity requirements set by lead firms, we show that precision fertigation technologies are necessary to overcome the participation barriers enacted by the citrus GPN. These technologies give growers a high degree of control over the biophysical conditions of citrus production, allowing for the consistent meeting of quality and quantity criteria. This allows us to further argue that access to precision fertigation technologies is a necessary condition for continued access to the citrus GPN. We show that in Citrus region the precision fertigation network that emerged to meet the changing needs of the GPN emerged among, and was captured by, the landed (white) commercial farmers and their kin groups. The network thus acquired, and reinforced, racial dimensions. It therefore became a new space for exclusion of HDIs from the agrarian sector, as well as strengthening the position of white citrus growers in the GPN.

We further show that this strengthening of the position of the white landed elite within the citrus GPN also enhanced their ability to access water. This had the consequence of alienating HDIs and causing a failure of water reforms to materialise. Our results showed that three key strategies are used by white commercial growers to access new water: (1) illicitly accessing water, (2) acquiring a controlling stake in BEE partnerships, and (3) acquiring new water through accessing the white-collar network of accountants, lawyers and water consultants. These three strategies have generally been available only to white commercial farmers with a strong position in the citrus GPN. Access to water is thus woven into the network of access to the citrus GPN. Black and coloured farmers are currently excluded from this network, albeit not only for racial reasons but also because of the path dependencies that accompany highly capitalised, specialised modes of agriculture that have high entry barriers. With that it becomes clear that the efforts of both state and HDIs for water reforms (mainly regarding new water allocations) keep failing as the technology strengthened access of white commercial farmers to citrus GPN enables them to access and benefits from new water, despite of regulatory constraints. This aspect of relational access to the GPN through water and precision fertigation technologies also makes clear that the citrus GPN network is self-reinforcing (Tienstra and Roth, 2013) or, in other words, that it deepens the path dependency of citrus production. Its racial characteristics, its opportunities for access, and its entry barriers are not shaped by one actor or one group of actors; rather, the network as a whole determines the opportunities for, and barriers to, participation, with the goal being the maintenance of the Citrus Region as an important node in the citrus GPN. The high entry barriers of the citrus GPN and the relative advantages it brings in water access also makes an already-difficult situation (the obstacles faced by HDIs in obtaining land, water and capital) into a rather impossible one. HDIs who do manage to access land or water through agrarian reform policies will still need to meet high entry requirements if they are to unlock the high value markets, whether export or local; this may prove to be problematic in the context of Western Cape.

Based on our results, the emergence of the GPN appears to be critical to the consolidation and expansion of landed, white commercial farmers, in a post-apartheid era that has been marked by the gradual demise of their political privileges in access to water and land. Thus, while new land and water reforms caused them to lose some of their political privileges, market liberalisation and the emergence of the citrus GPN provided them with an opportunity to expand their economic and racial kinship in emerging GPN arenas. Precision fertigation technologies and knowledge allowed them to set themselves up as being uniquely capable of meeting the quality and quantity standards of a global market.

The structuring impact of global production networks on country-specific agrarian reforms is not unique to the Citrus Region or even to South Africa. Through a case study of agrarian transformations in a region of Chile that is focused on export-oriented production of table grapes, Murray (2006) has argued that involvement in globalised networks has hindered the move away from feudal modes of production. As smallholders remain tied to large producers through debt, land and water becomes more concentrated, which favours those who are more capable of satisfying the needs of the export market. More importantly, it is argued that such outcomes of agrarian transformation are not simply a case of the stubborn prevailing of past inequalities, but rather that they are a result of the 'adoption' of these arrangements by neoliberal regimes. Bernstein (1996), through a case study of transformation of maize cooperatives, similarly argues that in the wake of the post-apartheid liberalisation of agriculture the white landed elite of South Africa has been able to reposition itself as hegemonic producers of maize for a liberalised market. While these studies do not build on GPN theory, they provide support to the argument that GPNs, through their conditions of participation, have a tendency to 'adopt' the pre-existing landed elites as producers thus hampering agrarian reforms.

In the case of the Citrus Region discussed here, and of South Africa in general, this tendency of GPNs translates along racial lines that reinforce the dominant position of the white landed elite in citrus GPNs and increases the likelihood of the subsequent failure of water reforms. This case highlights the need for broader reforms in access to networks of agricultural inputs and to the supply and downstream markets

in which commercial farming is situated. If the issue of HDI access to these networks is not resolved, HDIs will not be able to reap the benefits of improved land and water access. Cousins (2007) also argues that for land reforms to succeed there need to be broader agrarian reforms that address the issue of access to farming inputs. The success of HDI farming operations also depends on broader agrarian reforms that include reforms in the technology input supply network. Similar to the ability of the white landed elite to move up and down input and output supply networks in order to capture jobs and value, the presence of black and coloured agricultural input and technology supply businesses in those networks is needed for successful land and water reforms. It is essential that HDIs be included in what have historically been white spaces beyond the farm gate.

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