Urban political ecologies of the apple: practices of corporate-led and community-led trade in the London city region

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This article investigates the urban political ecologies of the apple in London city region. As one of the largest cities in Europe, London is a pertinent site to explore the challenges and possibilities of future food systems. The apple is used as a lens to explore the diverging urban political ecologies of corporate-led and community-led food systems. A mixed method qualitative research approach combines a series of semi-structured interviews with stakeholders involved in producing, distributing and trading apples with practice-based ethnographic fieldwork, responding to calls within urban political ecology for more situated and grounded approaches that build new understandings of socio-environmental practices. Research shows diverging practices and biophysical properties of the apple amongst producers supplying multiple retailers and those operating via a community-led trading mechanism, which includes a farmers' market and fruit and veg box scheme. Fieldwork suggests apple production for multiple retailers is retail-led, placing increasing pressures upon producers. Biophysical properties of the corporate-led apple are becoming increasingly standardised; narrow in terms of varietal range, and; privatised, via the rise of club brand apples. In contrast, fieldwork suggests community-led trade is based upon producer-led, agroecological approaches to production, distribution and trade. Biophysical properties of the community-led apple are context-dependent and diverse in terms of varietal range, quality and size. Community-led trading is identified as a mechanism for scaling agroecology through cultivating community social and ecological relations and producer-led approaches. To become more than marginal, agroecology and community-led trade require enabling policy, planning and legislative frameworks.

Keywords: apple; urban political ecology; city region; agroecology; practice.

1. Introduction

On a sunny autumnal day, a group of Londoners embark a minibus and head out of London to the peri-urban hinterlands of the city. It is 21 October - also known as National Apple Day in the UK. In celebration, the social enterprise Growing Communities have arranged a trip to one of the farms that produces apples for the community-led fruit and veg box scheme and weekly farmers' market they coordinate. The passengers are all either subscribers to the box scheme, shoppers at the famers' market or volunteers at the Growing Communities patchwork farm network. The organic farm the Londoners are visiting encompasses several acres of fruit trees with over 20 apple varieties. The trip includes a guided orchard walk with the growers and an opportunity to harvest and taste some of the apples. The Londoners return home with a bag full of apples and new understandings of where the apples they eat come from.

Globally, it is estimated that there are around 7,500 apple varieties, although some suggest this number could be far higher (Juniper and Mabberley 2006). In the UK, there are an estimated 2,500 apple varieties (Clifford, King, and Davenport 2007), with around 2,200 cultivars housed at the National Fruit Collection, Brogdale (Brogdale Collections 2018). Genetic studies suggest that the eating apple (*Malus domestica*) derives from the wild apple species (*Malus sieversii*) found growing in the mountain forests of Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and China (Juniper and Mabberley 2006; Global Trees Campaign 2020). The gradual evolution and migration of *Malus domestica* has been linked to its passage via networks of trading and travelling routes between China, Europe, India and Persia over many millennia, traced by the presence of apple trees grown from seeds thought to be deposited by travelling humans and horses. As "extreme heterozygotes", apple seedlings tend to produce significantly different apples than their predecessors. This extreme heterozygosity, combined with centuries of breeding, has led to significant diversity of eating

apple cultivars today and explains why most apple cultivars are a-sexually propagated via grafting (Juniper and Mabberley 2006; Morgan and Richards 2002).

Juniper and Mabberley (2006) suggest there are three phases of *Malus domestica* cultivars – early, mid and late. Early season apple cultivars tend to be brightly coloured (often red), thin skinned, soft, sweet, juicy and fragrant. Picked off the tree over several weeks, they do not keep well and can be easily bruised. Mid season apple cultivars tend to be less brightly coloured, harder skinned and less fragrant, with firmer flesh. They can be stored for one to several months in appropriate conditions. Late season apple cultivars tend to be darker coloured, harder skinned and lower in sugar but richer in flavour. They do not bruise as easily as early and mid season apples. Often still hanging on the tree into late winter, they can withstand cold temperatures and can be stored for several to many months.

Whilst the apple is one of the most popular fruits consumed globally, with around 76 million metric tons produced annually (USDA FAS/GAIN 2019), a small number of apple varieties account for the majority of apples consumed, with "club brand" apples (such as Pink Lady®, Jazz™ and Kanzi®) gaining an increasing share of the apple market. As Goland and Baeur (2004, 234) highlight "many of the old apple varieties cannot participate in the conventional market system because they do not meet its standards of appearance, they bruise too easily and they are unable to withstand the transport and storage demands". Approximately 7 varieties accounted for approximately 44% of global fresh apple production in 2010 (Red Delicious, Golden Delicious, Granny Smith, Gala/Royal Gala, Fuji, Braeburn and Jonagold) (Belrose, Inc. 2011, 68).

As Boyd, Prudham and Schurman (2001, 562) highlight, industrialisation seeks to "extend and deepen its control over biophysical properties and processes or bypass "natural obstacles" altogether." In the case of the apple, the rise of industrial food systems is leading to: 1. intensification of apple production, often encompassing agrochemical regimes; 2.

consolidation of apple production, distribution and trade, with fewer, larger farms producing large proportions of apple supply of a narrowing range of varieties for a consolidating range of multiple retailers, and; 3. retail-led regimes determining production practices and standards (Friedmann 2005; Bain, Ransom, and Higgins 2013).

Cultivation of top fruit is considered one of the most demanding of crops in terms of pesticides used per hectare, exceeded only by vineyards (Pretty 2005). Within the UK, a small proportion of commercial fruit and nut crops are cultivated organically (estimated at 5.7%) (2019 figures) (DEFRA 2020b). Research suggests dessert apple orchards (excluding the Cox variety) in the UK receive on average 17 fungicides, 6 insecticides, 2 growth regulators and 2 herbicides and 2 sulphur spray round per year (Mace et al. 2018). The number of commercial apple and pear growers in the UK has declined from an estimated 1,400 commercial growers in 1990 to approximately 400 in 2007 (Wilson 2007), with many small and medium-scale growers consolidating into large farm businesses. Regional grower co-operatives have been largely replaced by large-scale suppliers operating across wide geographical areas and large-scale producers with on-site packing and storing facilities, both predominantly working to supply multiple retailers. Three varieties - Gala (39%), Braeburn (10%) and Cox (18%) account for two-thirds of dessert apple area under production (2019 figures) (DEFRA 2020a).

Amidst broadening understandings of the links between industrial food systems and ill health, environmental damage and injustice (Frison and Clement 2020), there is recognised urgent need to shift towards more regenerative approaches to agriculture, including top-fruit production. Agroecology is identified as a “leverage point” for improving environmental and human health outcomes (Meadows 1999; Frison and Clement 2020) and as a pathway to sustainable and just food systems (IAASTD 2010; UNEP 2019; FAO 2018; DeSchutter 2014; Parsons and Hawkes 2018). Agroecological food systems are understood as “widely diverse”,

"shaped by context" based on a "fundamentally different vision of food systems that runs counter to the current large and globalised food systems that are based on specialisation, industrialisation, and comparative advantages assessed through narrow economic modelling" (Vaarst et al. 2018, 704). As a science, agroecology applies the study of interactions between living organisms and their environment and traditional farming systems techniques to agriculture (Wezel et al. 2009). As a practice, agroecology aims to enhance beneficial interactions and ecological processes, promote resource efficiency and reduce dependence upon external inputs within agroecosystems (DeSchutter 2014; Altieri 2004). As a movement, agroecology is based upon transformation for "healthy, sustainable and equitable food systems" (Holt-Giménez 2011).

As Vaarst et al. (2018, 704) highlight, food systems built on agroecological principles require attention not only to the way food is produced but also the ways in which it is "shared, traded, eaten and valued". Re-embedding relations within the food system through re-localising food systems (Hinrichs 2000) and cultivating food democracy through civic food networks and food citizenship (Renting, Schermer, and Rossi 2012) are recognised as critical components of just agroecological food systems. Direct forms of supply such as farmers' markets, community supported agriculture (CSA), farm shops and box schemes are considered key mechanisms that support small and medium scale agroecological producers whilst also providing opportunities for re-embedding relations and cultivating food democracy. In the case of the apple, direct forms of supply can enable exchange of small volumes of crops of a range of variety; offer more financially rewarding alternatives to wholesale distribution or multiple retail supply (Saltmarsh, Meldrum, and Longhurst 2011), and; build community ecological literacy through embedded and engaged forms of exchange (Mount 2012). CSAs and producer-led box schemes are considered particularly supportive mechanisms for small-scale and medium-scale agroecological producers (Saltmarsh,

Meldrum, and Longhurst 2011). However, such initiatives tend to be located further away from large urban conurbations, particularly inner city areas (Pilley 2001). In the context of the city region, Vaarst et al. (2018, 696) suggest agroecological food systems "consist of a complex web of smaller food systems, for example, involving CSAs, urban, and peri-urban farming and a number of different supply chains and levels of organisations, which interact and overlap internally as well as with surrounding landscapes and food systems."

The scaling of agroecological apple production, distribution and trading in the UK, particularly within urban environments, presents both a challenge and opportunity for amplifying sustainable and just food futures. In the remainder of this article, the apple is used as a lens to explore the urban political ecologies of corporate-led and community-led trade in the context of the city region of London. Section two presents the conceptual approach, responding to calls amongst urban political ecologists for more grounded, situated work that attends to the kinds of practices connected to social and environmental justice. Section three outlines the mixed method qualitative approach undertaken that includes a series of semi-structured interviews with stakeholders involved in producing, distributing and trading apples and practice-based ethnographic fieldwork. Section four presents fieldwork findings, focussing on the diverging urban political ecologies of corporate-led and community-led trade. The article concludes with a reflection on the potential implication of these diverging urban political ecologies of the apple for sustainable and just food futures.

2. Urban Political Ecology of the Apple

Urban political ecology (UPE) is a theoretical and political lens through which we can understand, challenge and structure inquiry into nature-society relationships, particularly the geometries of power involved in these relationships (Swyngedouw 2015). As Heynen, Kaika and Swyngedouw (2006, 11) outline, "it is the nexus of power relations and the social actors deploying or mobilizing these power relations that ultimately decide who will have access to

or control over, and who will be excluded from access to or control over, resources or other components of the environment". UPE emphasises the need to focus on the processes that consolidate power relations, intensify socio-environmental inequalities and bring about injustice (Swyngedouw and Heynen 2003). It further calls for attention to those processes that offer possibilities for reconfiguration of power relations, diffusion of socio-environmental inequalities and the potential for more just futures (Loftus 2012; Heynen, Kaika, and Swyngedouw 2006; Kaika 2019).

Over the last few years, there has been growing urgency amongst urban political ecologists in attending to and imagining alternatives to the current status quo: "documenting alternative localised socio-environmental practices, abstracting these practices, making them global connections and producing new visions to address mounting global socio-environmental challenges" (Kaika 2018, 1715).

There are further growing calls amongst UPE scholars for more "grounded" (Ernstson and Sörlin 2019), "situated" (Lawhon, Ernstson, and Silver 2014; Loftus 2012) approaches to exploring urban political ecologies. Informed by feminist standpoint theorists, this grounding and situating turn in UPE is centred upon the premise that knowledge as always from "somewhere" (Harding 2004). As Loftus reflects, the environment is lived as a simultaneously "bodily" and "global process" (2012, x). Whilst emphasising the need to attend to the micro-politics of the everyday and the embodied, this turn however does not negate the attention paid to investigating multi-scalar power geometries (Heynen, Kaika, and Swyngedouw 2006). Rather, as Kaika (2018, 1714) highlights, when doing UPE, we need to be both "like a frog…splashing into the murky waters of empirics" and an "eagle", to "broaden the gaze from localised struggles": such an approach attends to situated socio-ecological practices, processes and "minute empirical details", whilst also "zooming out" and

making connections between territories and scales to "develop broader conceptual contributions".

Lawhon (2013) describes "situated networking" as an approach to doing UPE – "situated" in that it attends to localised understandings of practices and values and how they are changed through diverse engagements, "networked" in that it highlights interconnectedness with other people, places and discourses. Similarly, Ernstson and Sörlin (2019, 367) propose a "grounding worlding" approach to explore urban natures, "grounding" in that it considers how urban nature is reworked in particular places and becomes diverse through situated understandings; "worlding" in that it considers how places and urban natures are never only local. Kaika (2019, 246) goes further and argues not only for situated, grounded approaches to doing UPE, but also for a scholarship of "presence" – described as an "embodied process of engaging with emerging narratives". Practice is identified as one of the ways not only to imagine but to engage with and embody alternative imaginaries (Loftus 2012) – including those connected to "the matter of nature" (Bakker and Bridge 2006, 21).

3. Materials and Methods

3.1. Case study context: London city region food systems

As an apex of urbanisation within Europe, the city region of London illuminates the challenges and possibilities of current food systems. At present, rising inequalities and power asymmetries reveal shortcomings of current dominant food systems. An estimated one in four working age adults and two in five children are living in relative poverty in Greater London after housing costs are taken into account (GLA 2016). One in five adults are experiencing low or very low levels of food security, the majority of whom are in work (60%) (GLA 2019). Whilst the food sector accounts for around 10.5% of jobs in London (GLA 2018), many are not paid a living wage. In 2015, over two-thirds (67.5%) of employees were found

to be earning below the London Living Wage in the accommodation and food service activities sector (ONS 2016).

Food consumed in the city region of London is largely determined by industrial food systems and corporate logic. In the UK, four multiple retailers (Tesco, Sainsbury's, Asda and Morrisons) account for approximately two-thirds of grocery retail spend (Kantar 2019). Estimates suggest multiple retailers account for an even greater grocery retail share in London (GLA 2005). As Lang, Millstone and Marsden (2017, 6) note, the UK food system is "highly vulnerable to the rising costs of diet-related ill-health, ecosystems damage, economic dependency, and social reliance on migrant and relatively low-waged labour"; these vulnerabilities are compounded in a city region such as London that is currently largely reliant upon "just-in-time distribution systems, complex contracts and labyrinthine supply systems".

Whilst dominated by the industrial food complex, there is an undercurrent of direct forms of supply within the London city region. There are an estimated 35 farmers' markets in Greater London (London Farmers' Markets 2020); a range of fruit and veg box scheme initiatives - including several national box scheme distributors and London-based box schemes, and; a broad range of community growing projects operating on public and private land, including 13 city farms and over 2,000 community gardens (Sustain 2013).

The social enterprise Growing Communities is identified as a case that offers insight into the challenges and opportunities of scaling agroecology in London city region through community-led trade. Based in the borough of Hackney, east London, Growing Communities initiated one of the first community-led box schemes and the first organic farmers' market in the city. Since 1997 they have been further working to create a network of patchwork farms in Hackney. Growing Communities operate according to two principles: first, community-led trade; second, agroecological subsidiarity. Through community-led trade, Growing

Communities aim to support the livelihoods of small-scale agroecological growers, whilst providing Hackney residents with healthy, affordable agroecological produce and scaling out the urban patchwork farms (Growing Communities 2020). Agroecological subsidiarity is based on the idea that agroecological produce is sourced "as locally as practicable" (Growing Communities 2020). Perishable salad is sourced within Hackney via the Growing Communities urban patchwork farm network. Potatoes, roots, brassicas and seasonal fruits are sourced mainly from the hinterlands of London where field-scale horticulture is more practical. Produce not currently available in the UK (including oranges and "hungry gap" veg) is purchased from mainland Europe, bananas from Costa Rica or Peru (Growing Communities 2020). The majority of produce for the veg scheme is sourced from around 25 small-scale agroecological growers, most of which are located within 100 miles of London.

3.2. Methodological approach

A mixed-method approach was employed to build understanding of the urban political ecologies of the apple, using the case of London city region as a starting point to explore the practices of producing, distributing and trading apples. A review of grey and policy literature was carried out including reports, policy documents and other publications published by local authorities, the Greater London Authority (GLA), UK Government and NGOs (including Sustain, Soil Association and Common Ground), as well as relevant food industry publications (including Fruit Produce Journal, The Grocer, The Fruit Grower), providing information on policy, legislative and planning context and the challenges facing the agrifood sector, with specific focus on apple production and supply. Primary data collected included a series of semi-structured interviews and practice-based ethnographic fieldwork.

Semi-structured interviews were carried out with 15 identified stakeholders involved in apple production, distribution and trading including: 8 apple producers (5 conventional, 1 certified organic; 1 mixed certified organic and conventional; one uncertified organic);

representatives of 2 suppliers and 1 growers' cooperative (all of whom supplied principally with multiple retailers); a quality control manager for a multiple retailer; 2 wholesale market development managers, and; a community-led trade coordinator (see Table 1 below). Five of the producers interviewed were supplying multiple retailers exclusively or predominantly, two were supplying the Growing Communities community-led trade initiative and one was operating an independent crop share initiative. Interviewees were approached mainly via email or phone.

Table 1. Interview matrix

Acronym	**Main trading pathway**	**Production approach**
P1	Multiple retailer	Mixed (certified organic and conventional)
P2	Multiple retailer, wholesaler, farm shop	Conventional
P3	Multiple retailer	Conventional
P4	Multiple retailer	Conventional
P5	Multiple retailer	Conventional
P6	Crop share (previously supplied multiple retailer)	Conventional
P7	Growing Communities as well as other farmers' markets, box scheme, farm shop and wholesale (previously supplied multiple retailer)	Organic
P8	Growing Communities	Uncertified organic
S1	Multiple retailer, wholesale	Conventional
S2	Multiple retailer	Conventional

S3	Growing Communities	Organic (certified/non-certified)
G1	Multiple retailer	Conventional
QCO	Quality control Officer, Multiple retailer	Both
WS1	Wholesale	N/A
WS2	Wholesale	N/A

Key: P: Producer; S: Supplier; G: Growers' Cooperative; QCO: Quality Control Officer; WS: Wholesaler.

Interview guidelines were adapted according to the specific interview context, although there was a consistent focus on practice. With producers, the interview framework covered: 1. production practices (including range of crops/varieties grown; approaches to pest and disease management and harvesting); 2. temporal and spatial dimensions of operations; 3. key challenges and opportunities facing operations; 4. how policy, planning and legislation could help or hinder operations. With other stakeholders, the interview framework covered: 1. trading background; 2. approaches to quality control and sales; 3. temporal and spatial dimensions of trading; 4. key challenges and opportunities facing operations; 5. how policy, planning and legislation could help or hinder operations.

Interviews with producers were conducted in person, asides from one interview conducted over the phone. All in-person interviews with producers included an orchard tour, with several interviews conducted whilst walking around the orchard site. Interviews with other stakeholders were conducted in person, asides from one interview conducted over the phone. All in-person interviews involved a tour of operations, asides from one interview conducted in the head office. Where possible, interviews were recorded and transcribed. In cases where this was not possible, detailed written notes were made. Ethical guidelines were

followed as set out by the British Sociological Association (BSA 2017) and Cardiff University (Cardiff University 2019). The research received ethical approval by Cardiff University Research Ethics Committee. Informed consent was sought from all those interviewed. The researcher further participated in 36 hours practice-based ethnographic fieldwork, assisting with two harvests at two sites and accompanying one of the producers at the farmers' market. Fieldnotes were kept during and after site visits aiming for "thick description" (Lincoln and Guba 1985), supporting reflection on impressions and experiences alongside the iterative analytical process of being in the field and analysing data (Brodsky 2008, 342).

Following Grounded Theory approaches (Charmaz 2006; 2008), interviews and field notes were iteratively read, coded and thematically analysed. The researcher conducted follow-up interviews with several stakeholders following initial analysis of interview transcripts and field notes. Interpretation checks of discussions were sent to interviewees where felt necessary. This iterative approach to data collection helped exploration of emerging themes (Charmaz 1990; 2006; 2008), whilst the interpretation checks and follow-up interviews constitute dual forms of corroboration (Nowell et al. 2017). All quotes included in this article are excerpts from transcribed interviews or via fieldnotes then corroborated with interviewees.

The research approach responds to calls amongst sustainable food scholars and urban political ecologists for a focus upon practice (Loftus 2012; Goodman, Goodman, and DuPuis 2012; Bakker and Bridge 2006). As Loftus (2012) elicits, the role of practice and the conditions of possibility that can emerge from practice can be fertile grounds for rethinking political ecology. Informed by scholarship on situated learning and communities of practice (Lave and Wenger 1991; Wenger 2018), practices are recognised as "loci of learning" where "tacit knowledge is constructed, harbored, and transmitted to newcomers" (Gherardi 2009:

354). As Anderson (2004) notes, “conversations in place” can be useful for “excavating” particular types of knowledge. “Farm tours” accompanying farmers as they work and take breaks (Cheshire, Meurk, and Woods 2013), and “mobile interviewing” with farmers can offer “devices, contexts, and instances that support and enhance the interview process, and also open up an appreciation of other forms of knowledge and narration” (Riley 2010, 651). Pitt (2015) highlights how knowledge can be generated through the process of being guided around by practitioners whilst Warren (2014) and Pottinger (2018) further demonstrate how working alongside practitioners can support richer understandings around practice, enabling engagement with non-verbal, embodied, inter-personal, tacit kinds of knowledge. Talking through, engaging with and embodying the practices and matters of producing, distributing and trading apples can help imaginative thinking about “possible futures” (Cheah 1996; Bakker and Bridge 2006).

4. Results and Discussion

Drawing upon fieldwork conducted, this section explores two diverging approaches to producing, distributing and trading apples: corporate-led and community-led.

4.1. Corporate-led apple ecologies

Fieldwork suggests both the biophysicality of the apple and the practices involved in producing apples for multiple retailers are becoming increasingly retail-led.

Producers supplying multiple retailers interviewed explained how infrastructure (such as cold stores and controlled atmosphere storage) and technological devices (such as penetrometers to measure fruit firmness, refractometers to measure apple sweetness and “intelligent” graders which sort apples including according to size and colour using computer vision-based algorithms) assist the meeting of retail-led standards. One large-scale commercial apple producer (P1) interviewed who supplies multiple retailers direct, attributes

their growing success to their scientific-technological approach to production part-funded by the multiple retailer they supply. A monitoring system installed in the orchards collects data on a range of variables including temperatures, humidity, air pressure and leaf moisture. Data is analysed on a global information system (GIS) and advice on irrigation, pest population and management and spraying regimes sent back to the producer. This producer suggests they spend approximately 80% of their working time checking the orchard monitoring system and implementing the proposed work-plan provided by the GIS.

In the case of the producers supplying multiple retailers interviewed (P1-P5), suppliers and multiple retailers were found to play a key role regarding production practices. As one apple supplier to several multiple retailers outlines (S1): "we get involved in the production of the fruit in three ways": pest and disease control, storage advice and marketing. Retail-led standards are found to play a significant role in determining production practices, including harvest approach. One producer working direct with a multiple retailer (P2) explains:

> They give us a specification of the fruit they accept. And one condition is that the fruit is measured by a penetrometer at 6 mg. so if we pick it too late, the fruit starts to decline once the fruit ripens. So if we do this too late the chances are it will be rejected.

As a result of the penalties enforced if retail-led standards are not met, a number of producers interviewed describe tightening their approaches to quality control. As producer two elicits: "we don't get rejections, basically, probably because we over-grade a bit".

Suppliers highlight the importance of maintaining their reputation for compliance with retail-led standards. As one supplier (S1) who works mainly with multiple retailers states:

> We manage quality…we've got a fantastic quality record as a company. We check everything here before it goes out, so we catch any issues with packaging or labeling

> which means the customer doesn't have any problems…we guarantee that what we send to them will get to the shelf.

Penalties can vary depending on where in the supply chain it is intercepted. As the same supplier explains:

> If we catch it here then it goes back [to the producers] and there's no fine, no penalty. They just get charged for the transportation and they get a chance to repackage it or decide whether they are going to downgrade it and send it to the wholesale market or what they need to do with it. And if they get stopped by the retailer, sometimes there will be a loss, there is a revenue involved. But more often than not, it gets sent back and it gets repacked. If it makes it to the stores and is rejected, it gets disposed of and we charge for that.

For producers working with multiple retailers either direct or via suppliers, adherence to retail-led standards is critical. Producer two reflects:

> We've been doing supermarkets for many, many years now. You either do what they ask or you don't…if you're constantly in conflict then it's a miserable life. You have to either just accept it or…There's no shortage of apples in the world so they can get it from elsewhere if we dig our heels in. particularly now they like these commodity apples like Gala and Braeburn which they'll stock 12 months of the year. They'll get them from England or somewhere in our season and they'll get them from South America and New Zealand in the off-season so they have them 12 months of the year.

Producers capable of meeting the big-set volumes and standards required by the multiple retailers tend to have the infrastructure and technological apparatus to support compliance. In contrast, small-scale and medium-scale producers without the infrastructure and technological apparatus to meet retail-led specifications can find it difficult to comply. As one producer (P6) who used to supply multiple retailers states: "One of the reasons we started to make juice was all of these imperfections…They [the multiple retailer] didn't want anything like that. We used to send it off to someone else". Supplier two explains: "we've

dispensed with people who didn't come up to the mark. But you can do that in a very ugly way or you can do it in a very cohesive way". Reflecting on the changing structure of the commercial apple industry in the UK, the same supplier reflects: "You'll find a lot of the old school guys are being squeezed. And their quality standards aren't quite high enough because they're not making enough money to invest in cold stores. You know, it's a vicious spiral downwards."

Findings indicate corporate-led practices are largely centred around investing in, managing and protecting brand identity – ensuring specific retail-led standards are met and penalizing those producers unable to meet them. As the quality control officer for one multiple retailer highlights: "I don't make any profit for the business - this isn't a profit-making role. What it is a brand and business protection…I'm here to police the quality of the product."

Globalisation of supply, retail consolidation and the rise of retail-led, globally harmonized standards are resulting in increased pressure on apple producers to meet retail quality expectations. According to supplier two, quality issues on apples imported from further afield tend to present less of a challenge in terms of quality control:

> We probably, touch wood, have less quality issues on a full load of South African Royal Gala packed to go to a [multiple retailer] depot direct than we would anything that is packed in Colchester or Maidstone or wherever. And that's because the sheer scale of costs concentrates the mind to make sure that it is 110% whereas somewhere down the road might think "Oh its only going up a road, it'll be alright, and if it's not alright, it's not a disaster." But you can't work like that anymore. I mean everything has to be 100% all of the time. I mean, there's room for negotiation I would say on the side on price. But things like quality become non-negotiable because it has to make the journey and nobody will argue that if you pack any item of produce it is effectively going into senescence and its never going to be 110% better than when it came off the tree or out of the ground. So it's got to be good.

The corporate logic is leading to the consolidation of apple production and varietal range, with the majority of apples produced on large-scale, intensive orchards with the acreage to produce big-set volumes of single variety yields and the infrastructure and technology to meet globally harmonized retail-led standards required by multiple retailers and larger suppliers. Evidence further highlights shifts amongst large-scale commercial growers towards the cultivation of club brand apples – "patented varieties that have exclusive growing and selling rights" (Legun 2015, 293), recognised as potentially more profitable. Supplier two reflects:

> Cameo, Rubens®, Jazz™ and Kanzi® grow very happily in an intensive orchard in a head-start management system. And it is economically much easier to make a profit out of them because it costs far less to grow them.

According to one large-scale apple producer interviewed: "what we call the "club apples"…Jazz™ being the prime example of that…are for all purposes better products" (P3).

4.2. Community-led apple ecologies

Fieldwork suggests producers supplying the Growing Communities fruit and veg box scheme and farmers' market with apples play a leading role in determining production practices and biophysical properties of the apple. The two producers (P7 and P8) interviewed demonstrate both producer-led practices and community-supported diversification.

Producer 7 runs an uncertified, biodynamically-managed small-holding market garden with an orchard. They explain orchard design is based upon minimizing pest and disease via selection of pest and disease resistant varieties, wide-spacing of trees and planting of trees in "harvest zones" to minimize pest and disease transfer, adding that an orchard of only one or two varieties would result in a shorter harvesting period and greater susceptibility to pest and disease transfer and frost damage. Following biodynamic practices, they do not spray or irrigate. Alongside selling fresh produce and flowers at the farmers' market and via the box

scheme, the producer was encouraged by Growing Communities to diversify product range (via jams, pickles, preserves and juice) to extend trading season and increase income.

Producer 8 manages a certified organic small-holding which includes an orchard with over 20 apple varieties and mixed livestock. They reflect that as a family business they have "grown" with Growing Communities, suggesting it was working with Growing Communities that led to diversification of farm operations and product range. When they were first invited to have a stall at the Growing Communities farmers' market, they mainly traded apples, rhubarb and a range of vegetables. Prior to this they were supplying multiple retailers and wholesale markets. When one of the meat producer at the farmers' market announced they were leaving, Growing Communities organisers proposed they integrate livestock into farm operations. With some experience of livestock farming, they purchased the flock of sheep from the farm that was leaving the market. Now, they rear organic chickens, sheep and beef cattle as well as growing over 20 varieties of apple on their orchards. At the farmers' market sell honey, apple juice, eggs, meat products and a range of cooked food including bacon rolls and sausages, alongside apples. They also supply another box scheme and farmers' market, a farm shop and occasionally trade wholesale. The producer explains that meat and egg sales now provide the main bulk of their income with apples providing something of a "bonus". In this case, the community-led trade mechanism supported deepening of agroecological practices as well as providing a route to market for agroecological apples.

Findings suggest the farmers' market and box scheme support producer-led approaches to harvest. As Producer 7 outlines, Growing Communities contact them one week in advance to find out what is available for the box scheme and order accordingly, whilst harvesting for the farmers' market is completely producer-led. To harvest, producer 7 explains, they "look for the colour, judge by eyes and feel." Similarly, producer 8 explains that they harvest apples by hand when they feel ready, suggesting "if we wouldn't eat it, we

wouldn't sell it." They also use visual and tactile judgment to check quality: hand-span (between thumb and forefingers) is used as a gauge to check apple size, whilst apples are checked for any blemishes bigger than a thumbs' coverage. Although producer 8 suggests they have greater flexibility in terms of quality control since working with Growing Communities compared to when they supplied supermarkets, they still aim for a "good class II" product, stating "people are paying for a premium product. It should be good, or they won't come back."

Agroecological orchard systems tend to be based on cultivating wide range of apple varieties. As producer 8 explains, diversifying apple varieties cultivated extends apple season, reduces vulnerability to large-scale pest and disease and weather damage and expands market range. Direct forms of supply such as farmers' markets and box schemes provide opportunities to overcome some of the potential challenges of cultivating smaller volumes of a wide range of apple varieties, offering flexibility regarding harvest timing and volumes, as well as size and qualities of harvested apples. Producer 8 for example does not view the tendency of some apple varieties to biennialise or be small-sized as problematic since they have a wide range of varieties to buffer smaller yields of specific varieties, further suggesting that that smaller apples can be popular amongst some consumers, particularly families with young children. Whilst producer 8 states they tend to avoid apples smaller than 55mm diameter, they clarify that the majority of smaller apples end up in children's bags sold at the farmers' market.

Direct trading can also support the trading of apple varieties that are thin-skinned or not suited for storage - such as early-season apples. In the case of the box scheme, apples are not handled by consumers until they collect their box. At the farmers' market, opportunities for producer-consumer interaction reduce "excess handling" - both producers 7 and 8 encourage apple tastings whilst producer 7 encourages customers to "self grade" or "D-I-Y"

quality control. Producer 7 explains that some customers use fruit for juicing, cooking or preserving and do not mind irregular shapes, blemishes or slight pest damage if they are cheaper. As a result, producer 7 offers two grades of apples for sale at the farmers' market: good quality eaters and apples for juicing or cooking. Producer 7 adds that they are often questioned about the qualities of the fruit at the market by customers. In response, they inform customers why apples may be russeted, slightly misshapen or pest damaged, outlining their biodynamic approach to production. Often, they accompany explanation with opportunities for customers to taste the apple variety, which producer 7 describes as "the most important part". As they elicit: "people taste the fruit and get very excited as the texture and taste is so very different to a supermarket apple…that is why they buy them." This producer reflects that that they feel their role at the farmers' market is not only as a salesperson but also as an educator.

Opportunities for producer-consumer dialogue at the farmers' market and box scheme newsletters support exchange of information, including introduction to less familiar apple varieties and explanation of apple features such as russeting. Producer 8 for example notes that Egremont Russets sell well at farmers' markets once customers are reassured that the russetting does not effect eating quality. Opportunities to engage with produce and practitioners at the farmers' market and via the box scheme newsletter builds consumer awareness around seasonality, local production conditions, crop and varietal diversity and agroecological practices. The weekly pitch of a small number of regular producers throughout the year further supports the development of social as well as ecological relationships.

Both producers highlight the challenges of making a living as small-scale agroecological producers. According to producer 8: "If we didn't sell direct, it [farming] wouldn't sustain us…wholesale prices just wouldn't sustain." Whilst community support for

diversification processes may enhance agroecological functions of growing sites and potential income, in the case of the producers interviewed, it has not been enough to cover livelihoods alone. Producer 8 explains that they depend upon a number of other trade routes, alongside the farmers' market and box scheme to achieve a sustainable livelihood. Producer 7 highlights that it is very difficult to make much of a profit from the farmers' market and box scheme, emphasising that other streams of income are essential.

At present, agroecological producers face a number of challenges to making a sustainable livelihood, largely influenced by the national policy landscape. As producer 7 reflects:

> The organic grower carries out multiple roles - wildlife habitat, nitrate management, building soil matter, carbon sink, but you get a lower yield for not splashing around chemicals and fertilizers… I don't get any subsidy yet if I farmed chemically I would… subsidy is the only reason most farmers stay in business.

Community-led trading is recognized as a mechanism that has the potential to support deepening of agroecological practices amongst small and medium scale growers; cultivation of more diverse apple ecologies, and; development of community engagement with agroecological produce, practioners and practice, building social and ecological relations in the process. However, for agroecological communities of practice to become more-than-marginal, an enabling political and legislative environment is required.

5. Conclusion

This article considers the challenges and possibilities for more sustainable and just food systems within the urban context of the city region of London. It does so by investigating two diverging urban political ecologies of the apple, focussing on the corporate-led and community-led practices of producing, distributing and trading apples and associated biophysical properties of apples.

Findings suggest practices of the multiple retailer are leading to: 1. global regimes of retail-led practices; 2. globally harmonised retail-led standards; 3. consolidation of production amongst a small number of large-scale growers. Technological innovations in monitoring, harvesting, quality control and storage provide opportunities for multiple retailers to gain increasing control of practices. The range of varieties commercially grown is found to be contracting and largely dominated by retail-led preferences for durability, storability and shelf life leading to a narrowing of apple varietal diversity. Corporate-led approaches to apple production are further found to be shifting towards privatisation of apple ecologies via the rise of club brands.

In contrast, findings suggest practices of the community-led trade mechanism are supportive of 1. producer-led agroecological practices; 2. community-based standards; 3. community supported processes of agroecological diversification. The farmers market and box scheme emerge as mechanisms that cultivate agroecological communities of practice and support diverse biophysical properties of the apple, enabling a wide range of apple varieties to be produced and traded. These mechanisms hinge upon the valuing of agroecological produce, practitioners and practices and the nurturing of community social and ecological relations.

Research however reveals the difficulties small and medium scale ageocological producers still face in making a sustainable livelihood. At present, agroecology is marginalised from policy, planning and legislation, whilst private agri-food standards and retail-led production regimes remain status quo. Community-led trading mechanisms demonstrate potential to support the scaling of agroecological practices within the context of city regions and beyond. However, to amplify, community-led trade and agroecological practices require governance mechanisms that penalise the ill-health, environmental damage and injustices caused by industrial food systems and policy, planning and legislation that

recognise and value the environmental and human health and justice outcomes offered by agroecological food systems.

The article makes a contribution to urban political ecology scholarship as a case study that explores the possibilities of urban political ecologies of the apple. Responding to calls amongst urban political ecology scholars for grounded, situated, embodied attention to practice (Ernstson and Sörlin 2019; Lawhon, Ernstson, and Silver 2014; Loftus 2012), practice-based methods are employed to investigate the possibilities of urban political ecologies of the apple. Findings support claims that talking through and working on practice with practitioners can offer insights into practice (Warren 2014; Pitt 2015, Pottinger 2018). Findings further suggest practice-based methods can develop more nuanced understandings around the nexus of power relations and possibilities for reconfiguration (Heynen, Kaika, and Swyngedouw 2006; Loftus, 2012; Kaika 2019), and; around the "matter of nature" (Bakker and Bridge 2006) – in this case, the matter of the apple. As Loftus (2012) notes, attending to the conditions of possibility that can emerge from practice can be fertile ground for rethinking the possibilities of political ecologies. The article demonstrates how embodied, engaged scholarship can enhance understandings around possibilities for sustainable and just food futures, and the challenges and opportunities for scaling change. Findings highlight the need for time and space within research environments to allow for the exploration of practice in embodied, engaged and sustained ways.

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