A vitalist approach to sugar-cane breeding in Barbados: In the context of the European Union Sugar Reform

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ABSTRACT

The European Union (EU) recently terminated the Sugar Protocol, which had provided a guaranteed minimum price for sugar exports from countries in the African Caribbean and Pacific (ACP) group. Caribbean sugar producers have responded in a variety of different ways. This paper engages with the adjustment of the Barbadian sugar sector; in particular, the agronomic cane breeding and selection program currently underway.

This paper demonstrates the value that vitalist materialism, as a philosophical approach, has for understanding the situated practices and politics of cane variety selection in Barbados. Approaching agronomic practices from a more-than-human, vitalist perspective has political as well as practical significance, illuminating the lack of attention given to the specific material relations and temporalities of sugarcane in national ‘adjustment’ plans.

1. Introduction

Sugar is a key agrofood commodity that has recently been subjected to significant market shifts, specifically in relation to the European Union (EU) Sugar Regime (Richardson, 2009; Richardson-Ngwenya, 2009). As a consequence of Europe’s Sugar Reform, the outlook of the Caribbean sugar sector has changed irrevocably and is producing important changes in the material economy of sugarcane production. These changes require us to move beyond policy and economics and move into the cane fields, the laboratories and the politics of agronomic research, in order to better understand the kinds of transformations that the Sugar Reform might produce. The system of guaranteed prices for sugar that the EU had long paid to former British colonies, including six sugar exporters in the Anglophone Caribbean, was first reduced by 36% and then abruptly terminated. The reform of the Sugar Regime (among other developments), has been discussed predominantly in terms of policy and material implications (World Bank, 2005). This paper instead seeks to explore how sugarcane, as a living or vital materiality, is enrolled in producing particular agro-industrial economies.

Through empirical engagement with the experimental practices of cane breeding in Barbados, I argue that the specific material affordances of sugarcane allow and disallow wider political economies of sugar (and associated commodities) to emerge. In the context of new market pressures precipitated by the EU Sugar Reform, the vital materialities of sugarcane are active in shaping the future of the Barbadian sugar industry and will play a significant role in the country’s fight to ‘adjust’ the industry to new conditions. I also discuss how the practices of sugarcane breeding are shaped profoundly by the nexus of policy and materiality, which is an important consideration, not least because of the drastic nature of the EU Sugar Reform. A vitalist approach to sugarcane in Barbados is provoked by the striking lack of critical attention to the vital materiality of the cane plant demonstrated by local managerial decisions and the National Adaptation Strategy (which represents the national vision of a future sugar-cane industry in a non-preferential trading environment).

Scholars of science and technology studies (Haraway, 2008) and posthumanist geographers (Bingham, 2006) have called for vitalist and/or relational materialist approaches to the study of economic spaces (Goodman, 2001; Whatmore, 2006; Jackson and Ward, 2008; Morris and Holloway, 2009). This paper works to build upon these arguments and more specifically, to explore the pragmatic
implications of the vitalities in question. In the specific context of the sugar industry of Barbados, what is the significance of taking this vitalist approach? To address this question, I explore the practice of cane selection and testing at the Barbados Agronomic Research and Variety Testing Unit (hereafter, referred to as the ARVTU). I start by briefly introducing the theoretical context; that of vital materialism. The paper then gives an overview of the methodology and the broad empirical context of this research: the EU Sugar Reform and Caribbean response (which is discussed in more depth elsewhere) (Richardson-Ngwenya, 2009), most particularly in Barbados. The following section highlights some key field encounters that were evocative of particular ontological points and resonated with a more-than-human approach. In addressing the implications of a vitalist materialism, I suggest the significance firstly, for critiquing the politics of restructuring of the Barbadian sugar industry and secondly, for understanding and informing the practices of sugarcane breeding and the possibilities for restructuring the Barbadian sugar industry. These insights suggest that vital materialism is a useful approach for engaging constructively with the policies and practices that shape agro-environments and political economies.

I conclude by suggesting two key theoretical contributions that emerge from this engagement with the vital materialities of sugarcane breeding. First, contrary to the common trope in posthumanistic geography to emphasise the surprisingness of 'volatility' (Clark, 2008) and 'radical uncertainty' (Braun, 2008) in material life, from an agronomic perspective, such uncertainty is mundane (Anderson, 2004), expected and in fact, part and parcel of their experimental practices. Second, what is interesting and significant, I suggest is instead the temporal disjuncture of response by different, interacting materialities (Bingham, 2008). In other words, it is the temporal response-abilities of lively material assemblages – which essentially make up political economies – that have radical effect and actively shape the geographies of Caribbean sugar. But first let us situate this idea in the context of geographical literatures around materiality.

2. Vital materialism

Calls to re-materialise geography are nothing new (see Jackson, 2000; Philo, 2000; Latham and McCormack, 2004) and a divergent range of materialisms have long been engaged by human geographers, the merits of which have been discussed elsewhere (Anderson and Tolia-Kelly, 2004; Anderson et al., 2006; Anderson and Wylie, 2009; Bakker and Bridge, 2006). Anderson and Wylie (2009) remind us that our ways of grappling with matter and materiality should be properly considered as distinctive ‘material imaginations’: ‘to think of matter is invariably to perform a material imagination’ (p. 320). Generally speaking, we can consider Marxist-derived historical materialism, which imagines a material nature construed as a set of physical constraints on, or as a context to, human action or culture (Bennett, 2010a, p. xvi), in contrast to post-structural material imaginations that grapple with the relational embodiment of human (political) actions (Butler, 1993). Then there are materialisms that call into question the category ‘human’ (Thrift, 1996; Murdoch, 1997; Whatmore, 1997, 2002) and redistribute agency to nonhuman entities (Latour, 2000). The notion of agency is here construed as a mode of action that has influence or affect upon an assemblage and therefore does not depend upon human intention (Latour, 2005).

The influential work of sociologists of science, such as Donna Haraway (1997), Bruno Latour (2005) and Isabelle Stengers (1997), has become indispensable to such geographies, which articulate a relational approach to nature and society, reconstrued as nature-society (Goodman and Watts, 1997; Goodman, 1999). In
the same capacities, characteristics or degrees of power (Bennett, 2010a, p. 106). This acknowledgement of and wonderment at the vitality of more-than-human geographies, a vitality that exceeds our relations with and representations of ‘it’ (Thrift, 2007), is an antidote to colonial and hierarchical (modernist) assumptions that non-human matter is inert, passive stuff to be used, shaped, consumed and dominated by ‘Man’ (Merchant, 1990).

One of the conceptual advantages of a vitalist materialism, I suggest, is that materialities are understood as animated by their own dynamism, or conatus, in Spinozan terms (Spinoza, 2001). This rather dated term (since critiqued for its lack of emphasis on relationality), referred to an inherent potential for change, or ‘a more to come’ (Anderson and Wylie, 2009, p. 330), refusing to fix nonhuman entities in a static space–time. Developing this notion, a common contention of new vitalists is that space–times are not external to relations, but change ‘according to the processual movements of matter’ and that lively materialities have their own ‘very specific temporalities and spatialities’ (Anderson and Tolia-Kelly, 2004, p. 669); a key point to which I shall return later in the paper. So, to sum up, vitality is at once an inherent quality and an emergent property, processually configured in dynamic relation. New vitalism is then an expression of relational materialism at large (Goodman, 2001). But what is essential to note is that from the perspective of vitalism, where we acknowledge a dynamic yet unknowable flux of life, we cannot claim, for more than a fleeting moment of ‘enchantment’ (Bennett, 2001), to know or fix any such inherent quality; ‘[T]he vital principle may indeed not explain much, but it is at least a sort of label affixed to our ignorance, so as to remind us of this occasionally, while mechanism invites us to ignore that ignorance’ (Bergson, 2002, p. 190, cited in Greenhough, 2010, p. 39).

To summarise then, in this paper, I accept the premise that non-human entities and relations have agency and multiple materialities, and that they/we participate interactively (or indeed passively) in the articulation of dynamic assemblages (Harrison, 2008; Latour, 2000; Stengers, 1997). I adhere to the now well-versed notion that ‘[a]gencies are everywhere, making ‘things’. They make economies, they make rationalities, they even make natures’ (Hinchliffe et al., 2007, p. 260; Castree, 2003). These agencies are collective matters, made up of all manner of humans and nonhumans, technologies and biologies (Hinchliffe et al., 2007, p. 260; Latour, 2004; Hinchliffe et al., 2005). Recognising the vital and interactive agencies of different materialities is critical to the future of sugar in Barbados. This theoretical insight is of practical significance; as policy making must take into account both radical uncertainty and duration if it is to be effective. The paper then complements the more generalised statement of Anderson and Tolia-Kelly (2004), who suggested that:

The materialities of political dispute […] are not always smoothly, or unproblematically, enroled or available, […] specific materialities can therefore come to be creative of both new modes of conduct, and forms of political consciousness, as they are enroled into networks in ways that are antagonistic, destructive and unruly’ (Anderson and Tolia-Kelly, 2004, p. 671; see Bingham, 1996; Hinchliffe, 1996).

Examining relations between different participants in the cane fields of the ARVU, this paper performs a vitalist approach that serves to highlight not simply the (obvious and) active participation of nonhuman materialities in the agronomic experiments of sugarcane breeders. More pertinently, I seek to question the political and practical significance of cane as a vital agent in the future of sugar sector of Barbados. Before unpacking these arguments through the case study, I will first introduce the broader context that informs the activities of agronomists in Barbados; namely, the EU Sugar Reform and the changing market conditions in which sugarcane is embedded.

3. The EU Sugar Reform and Caribbean Adjustment

It is important to engage with the EU sugar trading regime and recent changes to policy, as well as with more local adjustment policies, for it is these policies that are shaping both experimental cane-breeding practices and associated materialities in Barbados. In 2007, the EU unilaterally denounced a trading agreement known as the ‘EU–African Caribbean and Pacific (ACP) Sugar Protocol’ in lieu of new European Partnership Agreements (EPAs), meaning that preferences formerly given to Sugar Protocol countries for their sugar exports would be brought to an end. Under the Sugar Protocol, the EU Sugar Regime accepted 1.3 million tonnes of raw cane sugar imported from 18 of the 77 ACP countries, plus an allocation for India. The Sugar Protocol gave signatories, including Barbados, guaranteed duty-free access to the EU market at a fixed preferential price, for an agreed quota of sugar (Richardson, 2009). The arrangement was criticised by some for entrenching colonial relations of dependency (Beckford, 1972), while others considered the Protocol as a development tool providing foreign exchange and employment.

Notwithstanding the huge decline of Anglophone Caribbean sugar industries over the past forty years, in 2005, sugarcane still occupied an average of 31 percent of the arable land in the region

4 Barbados, Belize, Congo, Cote d’Ivoire, Guyana, St Kitts, Jamaica, Trinidad and Tobago, Malawi, Mauritius, Mozambique, Zambia, Zimbabwe, Swaziland, Tanzania, Madagascar, Kenya, and Fiji.

5 In 2005, the EU had already announced a 36% reduction in this guaranteed minimum price paid for sugar to both EU and ‘Sugar Protocol’ countries, to be introduced over a 4-year period commencing in 2006.
and more than 60% of the arable land in Barbados. As has been highlighted by the LMC International reports (2003, 2004) and by Caribbean governments,6 the EU Sugar Reform has significant implications for the Sugar Protocol countries of the Caribbean. There have been a variety of responses to the Reform, from political outrage to fatalism, and from factory closure to substantial modernisation and investment (Richardson-Ngwenya, 2010). I focus here only on the response of the Barbados sugar industry, examining the activities of the ARVTU in particular.

In 2007, in response to the shifting market conditions, the Government approved proposals for a multi-purpose factory that will cost an estimated US$150 million. Essentially, the project has the dual aims of both sugar and energy production. The new factory would generate 30 MW of electricity for the national grid as well as producing 10,000 tonnes of specialty sugar (for export), 5000 tonnes of specialty sugar (for the local market), 14,000 l of (anhydrous) ethanol for domestic and export markets and up to 10,000 tonnes of high grade molasses for local rum production (Government of Barbados, 2006). In order to accomplish this diversification of products, new varieties of sugarcane are needed that can produce both sugar and fibre, traits which presently are dominant in different crop varieties. The ARVTU has been mandated by its parent, the Barbados Agricultural Management Company (BAMC), to expand and intensify its current breeding and testing program in order to produce such varieties that will better serve the interests of more diversified ‘sugar-cane industry’.7

The feasibility of the ‘adjustment’ project is based on the availability of what is termed a multipurpose cane (MPC). The ARVTU has therefore adjusted its selection program in order to “find” a single cane variety with high fibre and a juice content suitable for production of sugar, ethanol, rum and molasses (Bellamy, 2006, p. 18). The new plans have entailed new agronomic selection criteria, hoping to generate new (and divergent) material traits in the cane plant. It is clear then, that policy – specifically the EU Sugar Reform and the National Adaptation Strategy – has important implications for material interactions, politics and agronomic practices on the ground. At the same time (and often at inconvenient times, as will be demonstrated below), the interaction of different materialities shapes how policies, politics and economic spaces unfold (McEwan, 2003). I will now briefly discuss how this research engaged with the agronomic practices of cane breeding at the ARVTU, before presenting a few vital encounters and explaining their significance.

4. Methodology: experimental practices

In order to gain experiential access to the vitality of sugarcane, 1 month was spent ‘interning’ at the ARVTU in Barbados, shadowing a Variety Agronomist. The period of work spanned ‘Stage One’ variety selection procedures for both conventional sugarcane and high fibre canes (HFC). While there, I deployed participant observation complemented by diary accounts, interviews, video documentation and engagement with the literature produced by the field agronomists. Different methodologies involved different registers of re-presentation and affect, generating: embodied experiences, memories and reflections; textual accounts and; digitised moving images (see Richardson-Ngwenya, 2007). Research experiences involved hands-on practical work and I approached the task by following the agronomist closely for the first hour of each new procedure, filming where possible, and then spending the remaining time as a general worker with the team. This strategy attempted to engage with the inter-active, inter-corporeal and experimental practices that bring variable bodies of sugarcane into the world. These multiple methods generated an abundance of ‘data’; too much to discuss here (see Richardson-Ngwenya, 2009). The methodology also effected how I learnt to be affected (Lorimer, 2010) and thereby theorized with the sugarcane and agronomists.8 Below, I will draw only on limited excerpts from the field diary and interviews.9

5. The cane-breeding assemblage: vital materialities

To get acquainted with the materialities of sugarcane, it makes sense to start by considering that the sugarcane plant is made up of fibre and juice. Sucrose is dissolved in the juice and is the component traditionally valued by the sugar industry; this ends up as the sugar we eat. The fibre is separated from the juice during the milling and refining process. This sounds quite banal, but of course, and to state the obvious, these composite elements of the cane plant are not simply there. They have been and are brought into the world through a variety of complex agronomic, industrial and technological processes. However, this stating of the obvious ignores the even more obvious role played by the cane plant itself. Taking a vitalist approach that attends to the lively materialities of sugarcane, we can explore how the sugarcane plant actively participates in the shaping of agronomic and industrial relations in Barbados, both actually and potentially, in very specific and significant ways.

Before undertaking fieldwork, I had already been struck by historical accounts of how a few key material properties of the sugarcane plant had shaped the historical geography of Caribbean islands (Richardson, 1992; Menard, 2006). For example, the very capacity of the cane plant to store carbohydrates as sucrose in extraordinary concentrations, as well to regenerate through several crop cycles, have been central factors in the historical development of sugar production and consumption across the world (Mintz, 1985). Industry workers know well that cane juice quality deteriorates rapidly once the cane has been cut. With time, enzymes and microbes recombine molecular chemical bodies, converting the sucrose sought-after by humans into not-so-sweet polysaccharides. This molecular recombination calls for highly managed harvesting and processing regimes and carefully planned geographies linking field to factory. As a giant grass, cane’s resilient, regenerative and rhizomatic character is well-suited to an environment such as the Caribbean, blighted by extreme weather events. These interactive and temporally-specific processes of material transformation and regeneration have been instrumental in shaping geographies of sugar production. So without even venturing into the field, it is easy to appreciate that the materiality of cane matters to the unfolding of geographies too often bracketed off into ‘human’, ‘agricultural’ or ‘economic’ realms. But I would like to take this rather obvious argument that ‘materiality matters’ somewhat further.

Participating in the cane selection process allowed me to interact in a particular grounded assemblage of plants, soils, plots, codes, instruments, pots, and more, located at the ARVTU in Barbados. In encountering over 20,000 cane plants, unreliable instruments, sweet-toothed rats and tired, sweaty humans in the

6 For examples, see: Gov. of Barbados, 2006; Gov. of Jamaica, 2006; Gov. of St. Kitts and Nevis, 2006.
7 In 2002, agronomists had already set about breeding and testing for a high fibre cane in anticipation of the need to diversify the industry and maximise economic value. The ARVTU undertook yield and quality testing and by 2007, the three most promising varieties had been planted across 260 acres (Bellamy, 2006, p. 20). However, in 2007, when the National Adaptation Strategy officially laid out the proposal to construct a new multipurpose factory, the agronomic demands changed and the BAMC demanded a single multipurpose crop, rather than one for sugar and one for electricity generation. This change in policy was highly disruptive to agronomic testing programs.
8 See Richardson-Ngwenya (in preparation) for a fuller discussion on methodological issues.
9 To maintain employee anonymity, various comments from participating agronomists/field workers are unattributed.
cane fields, the force of more-than-human bodies seemed to impinge more and more upon my understanding of how the future of the sugar industry of Barbados might look. For although the government plans to build a multipurpose factory fed by a new multipurpose cane, generating new and successful plant varieties is no easy or serendipitous matter. The specific vitality of cane affects how agronomists interact with it and thus how new economic spaces can emerge. To understand how agronomists engage with the materialities of cane, we must first consider that sugarcane is a hybrid polyplloid plant that reproduces primarily through vegetative means. New varieties of cane are generated by cross-fertilisation of existing varieties, which generates hybrid seeds. Germinated from seed, each plant is genetically unique but, from thereon, the plant is propagated vegetatively (through cuttings) and the integrity of its genotype is maintained (Bellamy, 1999, p. 1). To start a crop variety breeding program, each year, 20,000 genetically unique varieties are planted as seedlings at the ARVTU, thus beginning their journey through the 'variety testing and selection' process. This process, due to the duration of growth and harvest cycles, takes 12 years to complete, with less desired varieties vanishing as the more economically promising varieties are selected and multiplied. The variation of economic demands, as shall be discussed below, affects the material politics of the cane field.

To create the 20,000 unique varieties for the Stage One seedling phase, different cane families exhibiting desired phenotypic traits have been cross-pollinated to generate hybrid seeds. The BAMC plan for a new multipurpose factory has changed the selection and crossing environment at the ARVTU considerably. The MPC project has bought with it much confusion, with mis-communication and mis-management between different institutions a major problem. The contemporary disruption to the policy environment has affected the working practices of agronomists, as well as the material politics of cane breeding. At the ARVTU, I learnt that there is dispute and a lack of clarity over the levels of brix and fibre that constitute a desired MPC. Field agronomists are not sure whether to select canes (for re-production) with less than 20% brix or fibre content (which is how the BAMC have defined their 'virtual' MPC), as it is currently rare to find a plant containing both brix and fibre at this high level. Some agronomists believe it makes more sense to continue selecting separately for high brix on the one hand and high fibre on the other (i.e. creating two very different crops); instead of looking for opposing traits in one plant. In May 2006, the West Indies Cane Breeding Station, which is responsible for generating initial crosses and new seed varieties, issued a statement to the BAMC Board emphasising the importance of clearer communication from the BAMC to the agronomists they rely upon. This communication highlighted the specific temporal requirements of the cane plant and its breeding program. For example, it discusses that if the agronomists are to generate new hybrid varieties for testing, they have to give light (photoperiodic) treatment to selected parent plants from 15 June in order to synchronise the flowering times of parent plants, so that they may be cross-pollinated. Time–pressure is also an issue in that agronomists have to sow existing seeds from cold storage at a particular time so that the ARVTU can then plant seedlings out in the field in August, to catch the rains. Without clear communication from policy-makers and managers, the agronomists can not know which phenotypic traits they need to select from either parents or progeny (Rao, 11 May, 2006). The policy context and also the local politics in Barbados therefore translate into complicated material interactions in the cane field, while the vital affordances of sugarcane also affect what agronomists can do. This nexus of policy, practice and materiality is pivotal to the character of the sugar industry and to the (possible) future economies of sugarcane.

To illustrate this point further, from this early stage in the breeding program, agronomists have encountered surprising difficulties in trying to select and hybridize cane families to generate plants with higher fibre contents. For although the family selection technique has proved successful for centuries in the breeding and selection of traditional sugarcanes, there have become more complicated when applied to higher fibre canes due to apparent differences in the heritability of fibre traits. There is an extremely wide variation of fibrousness within family populations, which is related to the highly complex polyploidy of the sugarcane plant and this has affected the ways in which agronomists can interact with it (Bellamy, 2007, p. 25). This material variation has led to a more labour-intensive selection strategy based on selection of individual varieties, instead of 'families'. In practice, this means that the agronomists must – instead of observing family plots and visually selecting good-looking varieties to cross – physically walk through the plots and inspect 20,000 individual plants, making selections and testing canes on the basis of the factors highlighted in Table 1. These plants are tall, vigorous, closely packed and have siliceous spiky edges: walking through the fields to examine each one is not an easy activity (Fig 1). We can understand this heritability factor as agential; the specific material vitality of cane is exerting demands upon agronomic practice and shaping the procedures through which new cane varieties emerge.

Once the selected high fibre varieties have been planted in larger plots, then comes the need to test the canes at the whole-field level and under factory conditions. Between 2004 and 2006, the ARVTU collected yield data from both hand cut and mechanically harvested fields. When the high fibre project was initially conceived it was hoped that, due to the height (Fig 1) vigorous growth and strong root systems, biomass yields of the HFC varieties would

<table>
<thead>
<tr>
<th>Character</th>
<th>Target</th>
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<tbody>
<tr>
<td>Cane yield (tonnage per acre over four crop cycles)</td>
<td>35+</td>
</tr>
<tr>
<td>Biomass yield (tonnage per acre over four crop cycles)</td>
<td>50+</td>
</tr>
<tr>
<td>Number of harvests per crop</td>
<td>7+</td>
</tr>
<tr>
<td>Brix (%)</td>
<td>18+</td>
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<tr>
<td>Sucrose content (%)</td>
<td>10+</td>
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<tr>
<td>Juice purity (%)</td>
<td>65+</td>
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<tr>
<td>Fibre as a percentage of cane</td>
<td>25+</td>
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</tbody>
</table>

11 Brix refers to the concentration of sucrose and other soluble agents that are stored in cane cells.
12 Agronomists at the ARVTU refer to this potential MPC as a 20:20:20 cane; 20% fibre and 20% brix.
be around 150 tonnes per hectare (t/ha), but the total biomass yields in 2007 were estimated at only 90.6 t/ha. The Stage One trials had provided some promising data, but subsequent harvests had shown an unexpected decline in yield. This is illustrative of the uncertainty inherent in material outcomes in agronomic experiments and in material politics more generally. The unique vitality of different materialities is always open to change and so we are often surprised or disappointed by the realities that emerge.

Back at the cane breeding station, to complicate matters further, agronomists were experiencing unanticipated difficulties in simply getting the higher fibre canes out of the field for testing (de Boer, 2008). Experiments comparing harvest and yields in the same field with the same varieties showed that the harvesting machine was only managing to take about 50% of the total biomass from the field (de Boer, 2008). The problem is that the HFC varieties have lighter cane stalks than traditional high sucrose canes and so are more susceptible to being thrown out by the harvester’s extractor fans. Field workers tried to turn the fans off but one ARVTU agronomist reported that ‘[i]f the toppers and extractors were turned off the machines quickly choked’ (de Boer, 2008, p. 4). The specific vitality of the HFCs is, we could say, disallowing their enrolment into the material relations. Taking a new vitalist approach reminds us to consider in which a material life-form is embedded shape its vitality of participants, as argued by Latour, 1993; Callon, 1986). In turn, the agencies of cane and of the agronomist, which depend upon each other, will affect the emergence of new economic spaces in Barbados; the success of the new multipurpose sugarcane project hinges critically upon these heterogeneous material relations. Taking a new vitalist approach reminds us to consider how the relations in which a material life-form is embedded shape its capacities and vice versa. Further, vitalism demands that we attend to the specific and dynamic vitality of participants, as argued by Pearson (1999), ‘[o]rganisms cannot be treated as closed models simply subjected to external forces and determinations; rather, they have to be understood in more dynamical terms as open systems that undergo continual flux (p. 146, cited in Greenhough, 2010, p. 45). Further, the vitalist approach encourages us to remember our own ignorance and the limits to both our understandings and our interventions (Bergson, 2002). But having described a few ways in which the cane plants’ vital materialities participate in and affect the agronomic and industrial practices I witnessed at the ARVTU, let’s now return to the pragmatic question of why this matters.

6. The implications of cane’s vital materiality

What do these arguments about vital materialities teach us? Are these useful observations to make, and is this a productive way of framing the situation? Bruce Braun raised a similar issue: ‘… here a (…) worry intrudes: once the vitalist point has been made, it very quickly becomes uninteresting. Surprise as a punchline soon loses its punch. Too much research, it seems to me, sets out simply to demonstrate emergence, to the point where we may now want to worry about a new ‘romance’ of matter. How many times do we need to be told that objects are ‘ontologically unstable’?’ (Braun, 2008, p. 675)

I would agree that it is not worthwhile to tell this story of sugarcane breeding from a vitalist perspective simply to demonstrate an ontological point. Sugarcane, yes, is a lively and participative materiality. But this was taken as given from the outset. Instead, the significance of this argument for a more-than-human, vitalist approach to cane-breeding lies, I think, in its relevance to understanding the specific practices and politics of the new cane project in Barbados.

In terms of practices, we must remember that relational material crossings are the central preoccupation of variety agronomists. After generating crosses and propagating chosen varieties, the agronomists attend to the importance of generating healthy interactive environments: of the pivotal relations between people, soils, rains, machines and canes. The agronomists continually stressed to me the vital affordances of the cane plants and bemoaned that because of poor field environments, a cane variety was often, they said, ‘not given a fair chance to prove itself and show its true genetic potential’ (pers comm., 3 February, 2009). As I have mentioned, agronomists at the ARVTU also report the emergence of surprising material relations, such as the poor secondary and tertiary yields of the HFCs and the ongoing battle to physically cut and gather the bushy and tough HFCs from the field plots. Importantly, it is exactly these specific materialities that are neglected by other actors in the wider sugar sector. Policy makers and factory managers attend more readily to cost-cutting and administrative procedures, which often ignore the vital materialities of cane and cane-breeding.

This wider neglect of the specific materialities of cane, so central to the practices at the ARVTU, has political and policy relevance. An attentiveness to materialities is, I would argue, precisely what is missing from both the National Adaptation Strategy of Barbados (Government of Barbados, 2006) and the BAMC plans for the future of the industry. The problems facing the sugar industry are too often framed as a result of ‘local and global economies, markets and other externalities’ (Albert-Thenet et al., 2005), instead of acknowledging the vital participation of more-than-human environments in economic relations.

Engaging with the practices of cane agronomists lent itself to a heightened awareness of the so-called ‘radical uncertainties’ (Braun, 2008, p. 676) of material assemblages, such as the surprising decline in yields during the HFC trials. But this emphasis on radical uncertainty, common in the posthumanist literature, deserves some critique. Uncertainties, I would argue, may well characterise our hybrid worlds, but are they necessarily as new and radical and surprising as posthumanist geographers like to portray?

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14 This constitutes a difference of about 13 tonnes per hectare of cane harvested and was thought to be mainly due to pulverization of the cane by the cutters and extractor fans, causing the loss of fragments of cane and juice.

15 The ‘trash’, or leaves covering the stem of the cane, of the HFC varieties tends to cling more tightly to the stalks and so some of this trash ends up with the “clean” cane, which makes it more difficult to mill the stems for juice at the factory (de Boer, 2008).
Through exploring cane breeding practices at the ARVTU, we have seen how it is often not the uncertainty inherent in complex assemblages but the temporal disjuncture of response that is radical, or has radical effect. The uncertainty of generating new forms, through crossings and hybridizations, is assumed by cane variety agronomists. Uncertainty is expected. Due to the complex polyplody nature of cane and the complex interaction of a cane with its environment, it is impossible to predict what these bodies might become. Moreover, the process of generating new varieties of cane takes time. It is a slow, decadal process. However, as the canes persist or desist through the agronomic selection process, other kinds of bodies are also moving and gaining momentum, at different speeds: soils deteriorate; ARTU employees age and retire; planters sell off land to golf course developers; the BAMC wait for funding to commence building the new factory; agronomists wait for new machines to be ordered and received. These differing temporalities of inter-action have affects upon the sugarcane industry, and yet, as time moves forward and these things happen, a 20:20 MPC remains a ‘virtual’ crop at the ARVTU. The becoming of a new cane variety requires at least 12 years of interactively generating differences and replicating/multiplying specific exemplars of difference, through crossing, selection and vegetative cloning. The cane breeding and selection program at the ARVTU demonstrates precisely the importance of cultivating an awareness of the juxtaposition of specific materialities with different response-abilities, speeds and intensities. In taking a vitalist approach and so acknowledging these multiple temporalities of response and their often disharmonious interaction, we avoid the common tendency to fix nonhuman entities and agencies in static and contiguous space–time (cf. Lorimer, 2009). For economic adjustment policy to ignore these vital interactions can only be foolhardy.

Since the former Barbados Labour Party (BLP) government were voted out in the 2008 elections, there has been considerably less clarity on government plans for the Barbados sugar sector. A change of government in between approving industry proposals and actually commencing construction of the new facility was inevitably problematic. In an email discussion, an industry representative argued that:

A few of the new DLP appointed Board members opposed the plan when the BLP was in power so you know it would not be political to take the BLP restructuring plan and run with it without some form of dissecting. I do believe they will find out in the end that there is no other alternative given the size of our industry (pers comm. 2009, my emphasis).

As a result of this lack of clarity around the future of the industry, the acreage of HFC cane (…) has been reduced and it seems that these will be abandoned. With no directives from the Board to expand and continue with these canes, the field pessimists and those allergic to change have seen an opening to get rid of them [the HFC] (pers comm., 2009).

So in addition to the confusion at the ARVTU around selection criteria, the need to ‘be political’ has resulted in a (disputed) plan that pays little attention to the agencies and urgencies of the crop: the reproductive cycle and time taken to generate new varieties; the differential heritability for high fibre traits; the new demands of the HFC for different harvesting and processing techniques and machines; and the potential damage to soils that could be brought about by the extended harvesting period needed to profitably generate electricity from cane. Political wrangling, in multiple locations (lest we forget the EU-ACP negotiations around the new European Partnership Agreements), has effected what is taking place in the fields, from the molecular to the social to the ecological level. Political interests in the sugar sector have hampered the ability of agronomists to interact effectively with the new canes, diminishing their capacity to co-generate the vital relations of fibre and brix that the industry requires. The interactions of different bodies at the ARVTU are demonstrative of the more-than-human dimensions of politics. That is, it is not only the decisions of ministers, board members, planters and agronomists that count in the (actual and virtual) shape of the sugar sector. Although decisions and intentions are articulated by powerful human participants, the cane plant persists – in its asexual regenerative capacity and in its hybridised transformations – in making change and in shaping the socio-natures of Barbados. Indeed, the vital agencies and potential becomings of sugar/cane are always already caught up in political negotiations at work and are central to (potential) economies of sugar and cane products.

7. Conclusion

This paper has explored the ways in which policy changes issuing from the EU Sugar Reform are affecting material politics in the cane breeding fields of Barbados. From the polyplody character of cane’s genetic structure to the wide phenotypic variations between individuals and families, the vitality and material capacities of the cane are shaping relations at the cane-breeding station. Different canes afford as well as resist agronomists’ attempts to enrol them into desired configurations. Unyielding patterns of trait heritability and variable capacities to make different kinds of plant tissues, so sought after by the agronomists and their industrial sponsors, make the plants key participants in the ARVTU assemblage. For without sugarcane’s specific (and variable) properties and vital capacities, the Barbados sugar sector cannot succeed in surviving the EU Sugar Reform and establishing an industry of multiple material products.

The interactions at the ARVTU described here are therefore demonstrative of the material dimensions of politics. This is an assemblage where different kinds of power are expressed through different, interacting materialities. The field procedures discussed above demonstrated how the specific vitality of the cane plants actively shapes the achievements (or indeed failures) most often understood to be the result of the actions and intentions of an agronomist or planter; a purveyor of technology and scientific practice. Although decisions are articulated by powerful human actors, the cane plant participates in shaping the socio-natures of Barbados.

I have also argued that the temporalities of different, interacting materials and the ways in which they respond to change are key to envisioning the impact and results of policy-making. At the ARVTU, agronomists will only be able to develop a successful MPC variety if positive and well-timed relationships are built between different participating agents: the BAMC Board, the factory managers, the harvesters, the farmers and of course, the cane plants. The generation of a 20:20 MPC cane would be a ‘timely’ and collaborative achievement in this sense (cf. Latour, 1993).

Like Bingham’s (2006, 2008) exploration of the controversies around genetically modified corn in North America, this case has also shown that vital material temporalities are often overridden by industry efforts to profit, or political efforts to stake out positions of power. Bingham’s (2008) work highlighted the need to ‘slow down’ decision making processes in order to more adequately take on board more-than-human politics; an argument that is supported by this non-GM example (also see Hinchliffe, 2001; Whatmore, 2002; Hinchliffe and Blowers, 2003). The concern with material duration demonstrated here, makes clear the need to create policy-making processes that are not simply slower, but are more responsive to the relational temporalities and the
'normal' conditions of uncertainty and variation in which they participate. Through this study, a striking and surprising parallel between agronomy and vitalist philosophers has emerged. Both expect uncertainty and dynamism and respect the vital capacities of (plant) life as well as the relationships between different, living elements. A vitalist approach to materiality is then more forgiving to the misfortunes and frustrations of agronomists, who, try as they might, find the cane to be uncooperative in their experiments. This understanding, or vitalist sympathy, puts the agronomists in a rather antagonistic position vis-à-vis industry managers and economic policy-makers, who prefer a more predictable outlook. An unexpected solidarity between vitalist philosophy and the agronomists has thus emerged through this paper, which advocates a more distributive notion of agency that, one hopes, will generate a more subtle awareness of the complicated web of dissonant connections between bodies, and will enable wiser interventions’ (Bennett, 2010a, p. 4). Exploring the vital materialities of cane breeding, enables us to give critical attention to field-level practices and material politics. Such vital relations are ignored by policy-makers at their peril.

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