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## **DOING DEVELOPMENT-ORIENTED AGRONOMY: RETHINKING METHODS, CONCEPTS AND DIRECTION**

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### INTRODUCTION

This special issue brings together a selection of papers that not merely present agronomic research findings, but critically review orientations, methodologies and research practices in agronomy. The focus is on agronomic research as it conducted as component of rural development efforts in the global South or, in short, development-oriented agronomy. Aiming to contribute to development challenges like food security, human welfare and wellbeing, and environmental sustainability, a focus on development-oriented agronomy implies a step beyond a narrow understanding of agronomy as the science of crop production and soil management. Doing development-oriented agronomy forefronts the juggling with productivity enhancing, environmental and social developmental goals entailed when doing agronomy. What is more, development-oriented agronomy generally takes place within a complex environment of (inter)national research and development policy organisations, development donor-funded projects, governmental, NGO and private sector agencies and global professional networks and (public–private) partnerships. Consequently, development-oriented agronomy is a field where debate and contestations over goals and direction, research methodologies and findings of agronomic research are first likely to emerge and become apparent.

In ‘Contested agronomy: Agricultural research in a changing world’, Sumberg and Thompson (2012) set out and illustrated a research agenda to better understand the contestations, knowledge politics and power dynamics around agronomy in the developing world. They argued that contestations within agronomy have become increasingly common due to three developments: the rise of the environmental and participation agendas in agricultural science and policy, as well as the embedding of New Public Management principles in

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the funding and operation of (international) agricultural research institutions. Performance auditing and measurement, privatisation, the creation of an increasingly competitive funding environment, public–private partnerships have become part and parcel of publicly funded agricultural research for development (AR4D). The multiple objectives and funding sources, and the more competitive, short-term and impact-oriented funding context, have reconfigured the way in which development-oriented agricultural research is understood, funded, managed and practiced. Sumberg and Thompson have forefronted the politics of knowledge in development-oriented agronomy.

This special issues centres on how knowledge politics shape research practice in development-oriented agronomy, and agronomy as a discipline. Most, but not all, contributions were presented at the conference ‘Contested Agronomy: Whose Agronomy Counts?’<sup>1</sup> which sought to broaden the analysis of knowledge politics beyond known contested agronomy topics such as conservation agriculture (CA) and the System of Rice Intensification. A number of these conference contributions have been published in the book ‘Agronomy for Development: The Politics of Knowledge in Agricultural Research’ (Sumberg, 2017), which also outlines a heuristic framework for the analysis of knowledge politics in agronomy.

This collection of papers is grouped into two general themes. First, we reflect on some research methods used by agronomists, introducing papers that illuminate how knowledge politics affect agronomic research practice and outcomes. Second, we explore examples where knowledge politics are at the centre of contested agronomy.

#### RETHINKING METHODS

De Roo *et al.* (2019) explore the challenges that agronomists face when conducting on-farm experiments in the context of contemporary AR4D. Such on-farm research addresses the dual aims of, on the one hand understanding the efficacy and appropriateness of technologies, and on the other hand providing immediate benefits to the livelihoods of thousands of smallholder farmers. They argue that a tension arises between research and achieving impact at scale in partnership with development-oriented agencies. This leads to bias at multiple levels, from plot and farmer selection, to trial design and management. In turn, this compromises the relevance of results in terms of both knowledge generation and for the scaling of technologies.

This paper provoked Wall *et al.* (2019) to argue that de Roo *et al.* (2019) had not properly understood the approach of a number of AR4D projects in southern Africa Wall *et al.* were involved in, and that biases in the selection of locations and farmers that de Roo *et al.* reported did not exist. As a result, they argued, the criticisms of their approach were invalid and the methods that they had employed a *valid comprehensive approach ... for the successful development, scaling-up and scaling-out of agricultural technologies*

<sup>1</sup>The conference, Contested Agronomy: Whose agronomy counts? (<https://contestedagronomy2016.com>), was held at the Institute of Development Studies (IDS), Brighton, United Kingdom, 23–26 February 2016.

(Wall *et al.*, 2019). In a response, Andersson *et al.* (2019) suggest that the critique of the de Roo *et al.* paper misses the point. They argue that unintended biases are impossible to avoid when on-farm experiments have the dual aims of research and demonstration, that this tension was apparent in all of the case studies they examined, and that this has important consequences for both research and development.

Meta-analysis of experimental research is an increasingly popular tool in agronomic research. Krupnik *et al.* (2019) review the use of meta-analysis to evaluate two approaches that are the centre of highly politicised debates; organic agriculture and CA. Observing that meta-analyses on these topics have contributed to, rather than diminished or resolved controversy, they explore possible reasons for this. Krupnik *et al.* (2019) conclude that the way meta-analytical research is framed affects the design, execution and interpretation of the results of such analyses. This starts from the decisions made in the selection of experimental data to include, the inherent geographical biases within available datasets and the indicators analysed. Global conclusions are often drawn, but these have little relevance for deciding on the relevance or appropriateness of the evaluated technologies at local level. Consequently, the knowledge politics involved in formulating and positioning meta-analyses within ongoing debates in development-oriented agronomy tend to reinforce debate, rather than resolving it. Krupnik *et al.* (2019) offer suggestions to improve the relevance of meta-analyses, although the usefulness of such general approaches can be questioned if we accept that agronomy is a 'place-based science' (Giller *et al.*, 2015).

Much of the research conducted to understand the context within which changes in agronomic practice are expected to take place is garnered through conducting household surveys. Such surveys rely on the estimates and recall of smallholder farmers who rarely keep records. There is increasing concern that the data generated through such surveys may be less accurate than often assumed. More seriously, errors in plot area and yield estimations can lead to systematic bias and erroneous conclusions (Carletto *et al.*, 2013).

For this reason, the evaluation of data generated using farm household surveys of Fraval *et al.* (2019) is very timely. Their results are shocking – even variables considered to be fairly static, such as the land area owned by a household, showed major divergence between repeated surveys of the same farms. Variables of interest for monitoring impacts of technologies, such as crop yield and household food security were much worse. Despite optimistic conclusions on the usefulness of household surveys and opportunities for the improvement of survey data collection strategies, Fraval *et al.*'s analysis reveals there are quality limitations in all the survey tools they analysed. They highlight the need for robust survey design and the importance of enumerator training and supervision during the execution of household surveys. They also provide a persuasive argument for greater coordination among agencies and research organisations deploying large-scale surveys to increase the usefulness of the data collected.

How knowledge politics pervade research practice in development-oriented agronomy may be most visible in day-to-day research practice of agronomists conducting on-farm or on-station experiments in donor-funded AR4D projects. But such politics can also be discerned in research agenda setting and framing of development-oriented agronomic research, and conversely, in what is excluded or deemed not relevant for inquiry. The contribution of Snapp *et al.* (2019) on perennial grains in Africa provides an example of this. It provides entry points for an analysis of the knowledge politics around the annualisation of cereals, illustrating how plant breeders focus on the improvement of annual crops, may create a path dependency in the development of new varieties. Selecting for rapid crop growth and yield, other crop characteristics such as root development and regrowth capabilities get lower priority, resulting in a stronger annualisation of crops that also have perennial characteristics. Yet, as this paper on pigeonpea (*Cajanus cajan*) and sorghum shows, African smallholder farmers growing these crops may not merely value high grain yields but also their long duration and perennial characteristics. The paper thus underwrites the importance of observing and understanding farmer practice in proposing new directions in agricultural technology development.

Sustainable intensification (SI) is arguably the dominant framing of contemporary research efforts in development-oriented agronomy. Although the concept pulls productivist, environmental and social concerns into a single analytical framework, it also provides a banner for a continued, more narrow focus on yield-increasing technology development targeting smallholder farmers. Yet, as Harris (2019) shows, neither yield-increase, nor its re-framing as SI addresses the binding resource constraints that are characteristic for smallholder farming in the global south. Productivity increases resulting from the integration of new technologies in smallholder farming practice are by themselves unlikely to lift these farmers out of poverty. For agricultural intensification to become (economically) sustainable, requires a wider focus; an engagement with economies of scale and/or a re-framing of smallholder farmers as rural households engaged in multiple livelihood pursuits.

Ollenburger *et al.* (2019) also focus on SI, questioning whether smallholder farmers are looking for a Green Revolution in Africa. Despite an overwhelmingly strong coalition that promotes technology-driven intensification of smallholder agriculture, they conclude that technological solutions alone are insufficient. The most effective options for production increase appear to require cropland expansion combined with good crop yields, taking advantage of peak seasonal prices and focusing on livestock for meat production with small ruminants or sales of milk from cows. Moreover, off-farm employment opportunities such as gold mining are more profitable than agricultural options. Essentially, their core argument is a plea for more attention to the context within which agricultural development takes place. This also requires a deeper reflection on the role of agricultural research to ensure closer alignment with the priorities of farmers.

Another major concept framing much contemporary development-oriented agronomic research, is the powerful, yet ambiguous notion of yield gaps (Sumberg, 2012). While guiding agronomic researchers towards areas of production potential, simply declaring the existence of a yield gap does not imply it can or should necessarily be a target for yield-enhancing technologies or policy intervention. Silva and Ramisch (2019) provide a critical analysis of the methodology used to establish yield gaps (in western Kenya) and show the limited relevance of the concept for the understanding of production and productivity changes in smallholder agriculture (in the Philippines). By situating yield gaps within farmers livelihoods, they highlight the limited value of the notion and suggest a focus on the risks associated with narrowing yield gaps and the use of multiple performance indicators.

The paper of Hobbs (2019) on the development trajectory of CA in India is harder to situate in the Contested Agronomy debate. This paper follows the progress made in India for research and farmer adoption of CA since the publication of Erenstein (2012), who contested the idea that zero-till establishment of wheat in rice – wheat systems could be further developed into full CA systems. Hobbs' basic argument is that CA is a complex technology package and it takes time to overcome all of the technical and institutional barriers that were earlier highlighted.

#### CONCLUSION

The papers in this issue provide examples of contestations in, and analyse the effects of knowledge politics on contemporary development-oriented agronomy. They show how issues of power and politics shape research practice and hence, agronomic knowledge production, highlighting the need for agronomists to be acutely aware of the social environment within which they work. Rather than seeing this as an era of crisis, we acknowledge that the debates and disagreements discussed in this special issue are part of a general trend that has brought agronomy into the spotlight. Our common challenge is to rise to the demand for increased rigour required to deliver the high-quality science that is needed in what we have termed a 'Golden Age for Agronomy' (Giller *et al.*, 2017).

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