Available online at www.sciencedirect.com

ScienceDirect

Procedia Food Science 6 (2016) 51 – 55

Procedia Food Science

International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015)

Mapping the Complex World of the Smallholder: An Approach to Smallholder Research for Food and Income Security With Examples from Malaysia, India and Sri Lanka.

Patrick O'Reilly[a]

[a]*Crops For the Future Research Centre, Jalan Broga, Semenyih, Selangor, Malaysia*

Abstract

Smallholders continue to account for up to 87% of all agricultural holdings and 70% of the global food supply while consuming only 30% of the world's agricultural resources. However global investment in agriculture R&D is increasingly concentrated in a smaller number of countries and focusses on research concerning physical aspects of a limited number of commodity crops. While the benefits of this research to smallholders is significant. This approach to agricultural research reflects the needs of commodity food chains, rather than those of smallholder food webs. Leading to a focus on the alignment of the latter to approaches and practices more reminiscent of the former. This perspective may overlook the inherent strengths of smallholder systems and as a consequence, fail to maximise their potential and reduce the capacity of smallholders to engage in autonomous development strategies. A modified livelihood approach which allows for an exploration of complexity in smallholder systems offers a useful entry point for developing interdisciplinary research to support sustainable productivity gains in the smallholder sector

Peer-review under responsibility of International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015).

Keywords: Chilli, mycotoxins, pepper, risk assessment, Sri Lanka

* *Corresponding author*. *E-mail address:* patrick.oreilly@cffresearch.org

1. Introduction

Current estimates suggest that an increase of up to 50% in food production will be needed to meet the needs of a growing population over the next 35 years. While the intensive production of a small number of key species has contributed to dramatic increases in agricultural productivity and food supply, the worlds' perceived dependence on a narrow range of crops produced in input intensive systems has given rise to concerns over the environmental sustainability of large scale, intensive agriculture. Simultaneously there has been a renewed recognition of the

2211-601X © 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Peer-review under responsibility of International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015).
doi:10.1016/j.profoo.2016.02.010

important role that smallholders play in maintaining global agriculture. Smallholders continue to play a central role in crop production producing approximately 70% of the world's food on up to 87% of the world's current agricultural land and employing only 30% of agricultural resources. In addition the fact that small holder systems are adapted to the local agro-ecological conditions, supports the idea that they are less demanding on the local environment and require less external inputs in the form of artificial fertilisers and agri-chemicals. The fact that smallholder systems are known to produce a range of crops in a variety of rotation and intercropping systems is linked to significant local benefits to the household and community such as; supporting dietary diversity, reducing risk and has led to the popular characterization of smallholder agriculture as inherently more environmentally and socially sustainable than monocultures[1,2] It is therefore ironic that smallholder systems and many of the crops that they produce operate in a peripheral position in relation to agricultural research and development. In the engagement between smallholders and the research and development communities the predominant tendency is for the latter to produce solutions which support the further adoption of intensive monoculture of major crops.

In order to do so thisd paper considers way in which scientific research in relation the relationship between this scientific research and agricultural development approaches. Before outlining an alternative approach as employed in recent research which employs smallholder complexity as its starting point.

1.1 Agricultural research and development

Technologies and science continue to evolve dramatically as the challenges that face agriculture change. However in many respects research priorities continue to adhere to certain ideas about paradigmatic science in which *"innovation is understood primarily to mean technological innovation: innovations are scientific discoveries that can be given technological application"*.[3]Central to this episteme is the idea of functional differentiation, experts "carve nature by its joints," [4]to study and represent its discrete segments. A key feature of this process is that the scientific aspect of this work is portrayed as being discreet and based on objective forms of scientific validation. Alroe and Noe argue that research trajectories are still largely shaped by the "traditional politics of expertise" [5] within which scientific problems remain necessarily reductive; separate aspects of the crop are examined in isolation with limited consideration given to the wider biotic, abiotic and social context in which it is embedded. This approach contributes to technologies which reflect conventional commercial interests and favour styles of production that are suited to larger commercial ventures. Indeed it could be argued that, to a very large extent, this research trajectory supports the need of the most inefficient (in terms of resource use) and least sustainable production systems.
Simultaneously current approaches to agricultural research fail to respond to the needs one of its principle customers groups, smallholders. Leadign to questions as to how science ghered to their needs should be organised. A common feature of small holders systems are that they integrate a range of different types of knowledge and resources in delivering outputs. Complexity may offer a useful point of entry for research that addresses the complex challenges facing smallholders.

1.2 Integrating biological and environmental factors into an analyses of small holder farming

Farming practice is proposed as the point of entry within an analytical framework which explores the complexity of small holder practices such practices represent the co-produced outcomes of dynamic interactions between human, biotic (that is the biological) and abiotic (non-biological) factors within a specific spatial and temporal context. Farmers evaluate and incorporate aspects of the physical environment in which they are located into their farming practice, in a similar fashion they also interact with the biological environment. The relationship between these domains is dynamic; events in human, biotic or abiotic domains influence the others as, for example, in the case of climate change or soil degradation impacting local markets and plant species.