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The role of community-based livestock management institutions in the adoption and scaling up of pigeon peas in Malawi

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ABSTRACT

Although decades of research show long-duration pigeon peas (PPs) as a best-bet technology that enhances nutrition, soil fertility, crop diversification, food security, climate-change resilience, agroecological sustainability, and incomes of resource-poor smallholder farmers in Saharan Africa (SSA), PP adoption remains low. This exploratory qualitative study examines obstacles to PP adoption and their relative importance, strategies used to protect PPs from livestock damage, and the conditions that shape the emergence and effectiveness of Community Based Livestock Management (CBLM) arrangements to prevent PP damage. We conducted focus group discussions, participatory rural appraisal (PRA), and key-informant interviews in five communities at different levels and duration of PP adoption, and used theoretical insights from agrarian political economy. Livestock damage was the biggest obstacle to PP growing in new PP sites; poor markets and production factors dominated in the established sites. Individual crop-protection strategies were often time-consuming, costly, and/or ineffective. While chief-based livestock-management systems protected all crops satisfactorily during the rainy season, they were insufficient to protect PPs during the dry season. CBLM arrangements controlled livestock damage and protected PP relatively effectively throughout the year. Implemented only at the relatively established PP-growing sites, CBLM arrangements were most effective at the site (Mpokwa) where PP prices were good and markets reliable, PP was the top or major cash crop, PP growers were powerful and in the majority, and institutions pre-existed for use in CBLM. The findings lead to the following hypothesis: smallholder farmers are likely to invest time and energy in collective livestock-management approaches to prevent damage to pigeon peas when expected economic benefits of adoption exceed perceived costs for most growers, mediated by socioeconomic differentiation and power relations among major stakeholders. Future research should empirically examine determinants of CBLM emergence for PP protection and scale-up.

1. Introduction

Significant research shows that multipurpose and long-duration pigeon peas integrated into maize-based systems are a ‘best-bet’ technology for meeting multiple sustainable agricultural intensification needs of resource-poor farmers. Benefits include increased maize yields, improved nutrition and food security, incomes and livelihoods, soil fertility, crop and dietary diversification, cooking fuel production, and resilience to climate change (Kumwenda et al., 1997; Snapp et al., 2002, 2003a, 2003b; Gilbert, 2004; Bezner Kerr et al., 2007; Akinnifesi

et al., 2011; Mhango et al., 2013; Jones et al., 2014; Pachico, 2014; African Center for Biodiversity, 2016; Smith et al., 2016; Zulu, 2016). Despite these multiple benefits, the availability of suitable sites in many medium to low rainfall areas, and growing international demand,¹ the adoption and productivity of pigeon peas (*Cajanus cajan*) remains low in Sub-Saharan Africa (SSA) although there have been recent gains (Snapp et al., 2002, 2003; Okalebo et al., 2006; Saxena, 2008; Akibode and Maredia, 2012; Pachico, 2014)².

The expansion of multi-purpose legumes in SSA requires concerted policies and strategies that address major barriers that smallholder

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¹ There was unmet global demand for PPs, especially in India (for processing into dhal), Malaysia, Singapore, the United Kingdom, and the USA (Akibode and Maredia, 2012; Makoka, 2009).

² PP production in SSA increased by 11% and 35% in yield and area planted, respectively, between 1994–1996 and 2006–2008 (Akibode and Maredia, 2012).

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farmers face. Common barriers include high labor demand, poor availability of and access to improved seed, low yields relative to other crops, late maturity of many varieties, pests and diseases, poor markets, and poor extension services (Bezner Kerr et al., 2007; Simtowe et al., 2010; Pircher et al., 2013; Mhango et al., 2013; Franke et al., 2014; African Center for Biodiversity, 2016). However, the literature shows that: (1) the relative importance of barriers is rarely studied, and (2) livestock damage (herbivory) is often neglected as a major barrier (exceptions include Snapp et al., 2002, 2018; Bezner Kerr, 2009; Me-Nsope and Larkins, 2016a). Pigeon peas (PP) are particularly vulnerable to livestock damage because they are a semi-perennial legume that takes up to eight months (60–235 days) to mature (Houérou, 2017). The long gestation enhances biomass production and provides additional longer-term agroecological benefits compared to regular benefits of most annual legumes – a nutritious edible grain, biological nitrogen fixation, and income generation.³ Agroecological benefits include enhancements in soil organic matter and carbon, nutrient levels and diversity, moisture retention, and soil microbial activity (Kumar et al., 1987; Phiri et al., 1999; Rao et al., 2000; Snapp et al., 2002; Gilbert, 2004; Mhango et al., 2013). Yet because smallholder farmers in SSA generally intercrop PP within maize-based systems, the long gestation also leaves the PPs in the fields 1–4 months after maize and other annual intercrops have been harvested. This exposes PPs to heightened herbivory, which requires additional effort and resources to control.

Malawi epitomizes both the opportunities and challenges for scaling up PP production among poor smallholder farmers. The Government of Malawi's (GoM) agricultural and economic policies seek to double the contribution of legume and oilseed crops to agricultural production and to exports by 2020 in order to diversify the agricultural and export base away from maize and tobacco, respectively (GoM, 2012, , 2016). However, preliminary evidence suggests that livestock damage may be a significant barrier to PP adoption (Snapp et al., 2002; Bezner Kerr, 2009; Me-Nsope and Larkins, 2016b). Malawian farming communities have traditional systems to control livestock damage during the main growing season (November–April). While the systems also protect PP during its early stages of growth, the primary focus is protecting maize and associated annual crops. Yet why some communities develop community-based livestock management approaches (CBLM) that can reasonably contain livestock damage after maize harvests, and others do not, remains unknown and an important subject of research.

Using the cases of five sites in central and southern Malawi, and examination of socioeconomic and power differentiation using insights from agrarian political economy (Buttel, 2001; Bernstein, 2010), this study explores the emergence and role of CBLM for mitigating livestock damage to PPs within maize-based cropping systems. We use qualitative methods combining focus groups, participatory rural appraisal (PRA), and key informant interviews. The five sites were selected along a trajectory of, or duration since, PP adoption (low/none to high) in four districts of central and southern Malawi. The study specifically addresses the following questions:

1. What are the main obstacles to pigeon pea adoption and what is their relative importance?
2. What strategies do individual pigeon pea growers use to protect their crops from livestock damage, and how effective are they?
3. What factors facilitate the emergence and effectiveness of CBLM approaches for managing livestock damage to pigeon peas?

In the following sections, we briefly contextualize socioeconomic/class and power differentiation within an agrarian political economy approach to examine how it shapes cooperation and the emergence of CBLM to protect PPs. Following background information on Malawi and

the study sites, we describe the methods used. Study findings cover barriers to pigeon pea adoption and their relative importance by site, level/duration of PP adoption, and strategies (individual, chief-based, and community-based) adopted to address livestock-based PP damage and their effectiveness. A discussion of salient issues, themes and ideas surrounding the emergence (or not) of CBLM and the role of socio-economic/class and power differentiation, social structures, and institutions follows. We end with acknowledgement of study limitations before touching on potential implications and concluding the article.

2. Social, economic and power differentiation, and cooperative action

Insights from agrarian political economy can help to illuminate how differential relations of power in agrarian production may mediate the emergence of collective livestock management arrangements as smallholder farmers respond to economic and other incentives and changing dynamics surrounding PP production. Agrarian political economy investigates “the social relations and dynamics of production and reproduction, property and power in agrarian formations and their processes of change, both historical and contemporary” (The Journal of Agrarian Change cited in Bernstein, 2010: 1). Engagement with critical agrarian theory is, however, beyond the scope of this study. We invoke elements of agrarian political economy narrowly as an organizing frame to examine how rural social and economic class and status may shape differential relations of power among key social actors and help to explain the emergence of CBLM to protect PPs.

The current study is more about enhanced understanding of what shapes the emergence of CBLM in the process of ‘commodification of subsistence’ as smallholder farmers mobilize their land and labor into PP commodity production than about Marxian/Leninist processes of class formation (Buttel, 2001). It is about “examining their differentiation”—particularly by socioeconomic classes—in order to know who benefits (Bernstein, 2010: 76). We frame the analysis of livestock-control/PP protection strategies around the four key questions of agrarian political economy that encapsulate social relations of agrarian production and reproduction; namely, who owns what, who does what, who gets what and what do they do with it (Bernstein, 2010)? The answers can reveal both the relative socioeconomic status of main actors, and their motivations, and their relative power within the social relations of PP and livestock production, which may influence the emergence and performance of CBLM. This approach goes beyond simplistic technology-transfer models (e.g., Rogers, 1962), and includes examination of the role of institutions in mediating the attendant power relations and accumulation of wealth.

Cooperation is an important strategy to enhance the productivity of farmers' labor. It produces “complementation effects” involving “adding individual labor to a process which only makes sense as a completed whole” (Bernstein, 2010: 17), e.g., investing individual effort in CBLM to protect PPs. It can produce economies of scale and beneficial timing effects, such as extending livestock control beyond the rainy season to protect PPs throughout the year. Just as the commons literature prescribes collective action through common-property systems as a solution to the common-pool resources problem (Ostrom, 2015), cooperation also makes sense in individual-level (petty) capitalist production. Bernstein posits that Marx's notion of the ‘collective worker’ extends to “people's capacity to organize themselves to make decisions about production, to carry them out and to innovate” (Bernstein, 2010: 29), as CBLM entails.

3. Study area and methods

3.1. Background and description of study area

Malawi is a small, densely populated, predominantly rural (84%), and agriculture-dependent country in southern Africa. Half (50.7%) of

³ Over 37% of under-five children are growth stunted, 39% in rural areas (NSO, 2017b).

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