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Can more drought resistant crops promote more climate secure agriculture? Prospects and challenges of millet cultivation in Ananthapur, Andhra Pradesh

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ABSTRACT

Amidst growing concerns about the threats posed by climate change for rural livelihoods, policy makers have given increasing attention to the need for more climate secure agriculture. This paper explores the challenges and opportunities of encouraging the cultivation of millets, a class of coarse grain cereals that are both water efficient and drought resistant, which are prominently grown in rainfed regions of the developing world. Based on a qualitative study in the Ananthapur District of Andhra Pradesh, India, we explore how millets factor into households' production strategies and their role as a risk response strategy. Millets, we found, play an important role in mitigating households' exposure to climate risk, both by diversifying production portfolios and as a contingency crop to confront delayed rains at planting time. Nonetheless, there remain important limitations for the viability of millets due to their low income generating capacity. To have a more significant impact on welfare and sustainability, policy needs to address the structural conditions of vulnerability that limit the viability of more secure livelihoods. We explore some of the ways that state intervention can make millets more viable by enhancing their terms of marketability and by providing other kinds of support.

1. Introduction

Amidst a growing concern about the threats posed by climate change for rural livelihoods, scholars and policy makers have given increasing attention to the need for more climate-secure agriculture (Wheeler and von Braun, 2013; Davidson, 2016). This is a notable departure from the past. In countries such as India, dominant development agendas have focused largely on maximizing productivity through high-input intensification (Pingali, 2012). While these trends have certainly improved productivity at the aggregate, growing dependence on scarce water resources has simultaneously brought new patterns of exposure to climate risk while also accelerating groundwater depletion in many regions (O'Brien et al., 2004; Rodell, Velicogna, & Famiglietti, 2009). More water efficient crops have been proposed as a focus of policy support, particularly in arid and semi-arid areas where water resources are scarce.

Of course, all agricultural production is susceptible to adverse climatic conditions. As a wide body of scholarship has documented, rural societies already have numerous strategies to confront climate risk (Mortimore & Adams, 2001; Adger et al., 2003; Kattumuri, Darshini, & Esteves, 2015). Scholars have argued that it should be possible to identify such strategies in order to develop a policy architecture that can encourage more effective local responses (Agrawal, 2010, Osbahr et al., 2008; Nyong, Adesina, & Elasha, 2007). As we argue below, providing support for crops that are utilized by farmers for their capacity to confront climate risk could offer an effective means to promote more climate secure livelihoods.

This paper aims to explore the prospects and challenges of incorporating more drought-resistant crops into a regime of climate secure agriculture through a study of millets. Millets are a class of coarse grain cereals that are grown extensively in semi-arid tropics of Africa and Asia. They come in a number of varieties, including the commonly consumed finger millet, pearl millet, and

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Fig. 1. Field of sorghum (*jowar*).

Fig. 2. Pearl millet (*bajra*).

sorghum as well as a number of other varieties often collectively referred to as minor millets, such as kodo millet, foxtail millet, proso millet, little millet, barnyard millet, and others (see Figs. 1 and 2). (Names vary across different languages and regions in India; to avoid confusion, this paper will use the standard English terms for each millet.)

To date, millets have largely been overlooked by agricultural policy, but they have gained increasing attention among activists and non-governmental organizations working in India in recent years (Millet Network of India, 2015). Millets are drought-resistant and water efficient: they tend to withstand prolonged exposure to drought and their water needs are less than other cereals such as wheat and rice (see, for example, Padakandla, 2016). It is no surprise, therefore, that millets are especially common in unirrigated tracts of land in India, where they make up approximately 35% of area under cereal production, as compared to approximately 3.5% of area under cereal production in irrigated lands (Agricultural Census 2010–2011). Millets are desirable for other reasons as well. They are nutritious when compared to rice and wheat, and they generally require few chemical inputs; thus, investments in production tend to be low. To the extent that millets are often grown in areas that have not benefitted from dominant agricultural growth trajectories, support for millets may also help to promote growth in areas struggling with high levels of poverty. Yet because they lack the broad array of price supports and subsidies that many other crops receive, millet production has seen a steady decline over the past several decades. To date, there is little scholarship about the opportunities and challenges of encouraging millet cultivation as a means to build more climate secure livelihoods.

This paper reports the findings from a short study of millet production in the Ananthapur District of Andhra Pradesh, India. Ananthapur is a very dry district which receives less than 600 mm of annual rainfall on average. It has a history of production of a diversity of millet varieties—including sorghum, finger millet, pearl millet, and foxtail millet. It is also the site of extensive efforts by a variety of NGOs to promote millet production and consumption in recent years. In October of 2015, we led a team of field assistants to conduct surveys and qualitative fieldwork on millet production within five panchayats (local elected village units) spread across three mandals (secondary-administrative units) of the district. Study sites were selected to vary according to socio-economic conditions, the distance from the nearest market center, and whether an NGO is active in the village. Our team undertook detailed discussions with residents in the study villages about changes in agricultural production strategies over the past ten years, perceived risks associated with different crops, and changes in millet consumption patterns. Although the sample is small, our data should nevertheless reflect some of the diversity of current millet production trends in the area.

Millets, we found, play an important role in mitigating households' exposure to climate risk, both by diversifying production portfolios and as a contingency crop to confront delayed rains at planting time. Nonetheless, there remain important limitations for the viability of millets due to their low income-generating capacity. In the following sections, we discuss the role of millets in household production strategies in the area. In the discussion, we explore some of the ways that structural changes in the millet economy could make millet production more viable in the coming years.

2. Agricultural change in Ananthapur

The Ananthapur District is situated in the southern part of India's state Andhra Pradesh. One of the driest districts in all of the country, low rainfall and high variability is a significant constraint on agricultural production in the region. Historically, millets were an important staple crop due to their resilience in the face of drought.

There has been a general decline in area under millet production in Ananthapur over the years (Fig. 3). Over the past several decades, state extension has given extensive support for high value crops, especially groundnut, which today is the dominant crop in the area. Additionally, the past two decades have seen growing investment in bore well construction, which has also made it possible to grow other water-intensive crops such as rice and vegeta-