Certifying Principles of Ecological Agriculture: A Case Study in Integrated Pest Management

Intro:

In the 21st century, agricultural systems are at the nexus of social and environmental challenges: providing sustainable livelihoods for rural communities and sufficient nutrition for all, while conserving ecosystems and protecting climate, air and water. Farmers, scientists and civil society groups have developed and promoted many strategies for

Integrated Pest Management (IPM) is one of the most prominent frameworks for increasing eco-efficiency in agricultural systems. First formulated in \_\_\_\_, IPM is now promoted by a wide array of organizations throughout the world as a means of increasing yields while reducing harms from agrochemical use and ensuring the sustainability of food supplies. More recently, IPM has been conceived of as encompassing several principles, though their exact composition is disputed.  The EU Framework Directive 2009/128/EC lays out 8 principles:

1. Prevention and suppression
2. Monitoring
3. Decision based on monitoring and thresholds
4. Non-Chemical Methods
5. Pesticide Selection
6. Reduced Pesticide Use
7. Anti-resistance Strategies
8. Evaluation

IPM can be utilized in any cropping system, anywhere in the world, and different manifestations may look very different. As Barzman and colleagues note (2015) IPM is “shaped according to site-specific factors such as regional cropping pattern, field size, type and availability of semi-natural habitats, the broader landscape, cultivation practices, pest pressure, R&D efforts, availability of training, farmer attitude, and economics.”

In recent years, 3rd party certification has become an increasingly important element of food systems governance, as exemplified by Organic, Fair Trade, Non-GMO and other labelling schemes. Third party labels attempt to differentiate agricultural commodities as being higher quality, less environmentally harmful and/or more socially responsible. These differentiated products can thus command a price premium, which rewards producers who use desired practices, and incentivizes producers to change practices.

The large international consensus behind IPM means that many different agricultural certification programs include it in their requirements. But defining and measuring the adoption of IPM across farms is not a straightforward task; the principles may be applied in very different ways across different farms. Some argue that IPM adoption is best thought of as on a continuum- from monocultures with calendar spraying, to “ultimate IPM” where system design is reduces pest damage to near 0 without chemical intervention (Benbrook, 1996).

Principles and systems-based approaches to agriculture are often difficult to delineate (Dube, in review). Because these approaches can take very different forms across contexts, it may not be possible to create a simple method for distinguishing between farms who have adopted, and those who have not. This has been noted in the specific instance of IPM (Bottrell & Schoenly, 2018) but also for Conservation Agriculture (Giller et al., 2009) and silvo-pasture (Orefice et al., 2017). But a clear delineation is required for promoting these systems through subsidies or certification, for measuring the success of efforts to promote them or to compare their environmental and economic performance with status-quo farming.

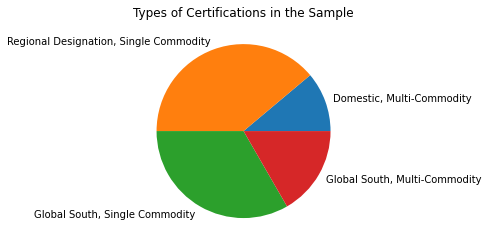
Certification programs which promote IPM are an ideal context to explore alternative agriculture systems certification. There is a wide range of diversity of programs- certifications differ in their geographic scope, from small regions to international, and in their crop scope; from single commodity to any food commodity. Likewise, these programs differ in their origin and intentions, they may come from environmental or development NGOs, university extension services or some combination of the 3. Examining this set of certifications can give insight into the universe of possibilities for certifying and delineating principles-based alternative agriculture systems.

**Methods:**

A set of eco-labels for foods sold in the United States were assembled from the ecolabel index (cite). Inclusion criteria were: labels must be used (directly or indirectly) in the United States, and that the certification protocol must reference the framework of “Integrated Pest Management” in all, 20 certification programs were identified (Table 1). The certification protocols for these programs were inspected line by line and the criteria related to IPM were coded and categorized. Because some certifications included requirements relating to worker safety in handling pesticides under the rubric of IPM, these types of requirements were included for all certifications.

**Results:**

**Sample Description:**

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The scope of certifications are categorized across two dimensions, geographic and commodity group. Geographically, certifications were either for all areas within the United States, domestic but confined to a particular region, or focused on producers in the global south. In commodity scope, certifications were either for a single commodity/commodity group or for a wide range of commodities. Of the six possible combinations, only 4 were represented, there were no regionally specific multi-commodity standards and no domestic nationally applicable standards for a single commodity group.

**Overall certification type:**

**Certification Structure:**

The criteria used within certifications were coded as being ‘affirmative requirements’, which farms must meet all of to pass, “scorecard criteria” where farms must earn a certain number of points to pass, and ‘improvement criteria’ which are scorecards where the farm’s performance must increase over time. 6 standards were coded as “primarily scorecard” with relation to IPM, 5 were coded as solely requirement-based, and 8 were “mixed” between requirements and scorecards and/or improvement.

**Summary:**

**Commonalities between certifications:**

**Key Differences in Certifications:**