

Exploring the Effectiveness of a Rapid Participatory Method in Mapping the Role of Agricultural Biodiversity in Local Food Systems

Identifying Potential Entry Points to Improve Peoples' Capabilities to be Nutrition Secure in Son La Province, Vietnam

Molly Ahern^{1,2}, Jessica Raner^{2,3}, Pasquale De Muro¹, Gina Kennedy²

¹Università degli Studi Roma Tre, Fac. di Economia, Italy

²Bioversity International, Healthy Diets from Sustainable Food Systems Initiative, Italy

³Ghent University, Coupure links 653, 9000 Gent, Belgium

Overview

Despite a large progress made in agricultural productivity and food security, micronutrient deficiencies remain manifested in malnourished as well as obese populations in Vietnam. Decreased diversity of foods is a growing issue, and the existence of malnutrition in regions where staple crop production and food availability are sufficient, highlights the necessity for a multidisciplinary approach to design interventions that target the four dimensions of food security - availability, access, stability and utilisation, of diverse locally available nutritious foods.

The Four Cell Approach to participatory research (Bellon & Raneri 2014) was used to rapidly identify trends in a) species and food usage in a landscape and b) the dynamics of the food system which may contribute to, or be leveraged to improve, peoples' capabilities to be nutrition secure. The case study presented here of Yen Chau district of Son La Province, Vietnam, demonstrates the use of a participatory method to map the role of agricultural biodiversity in production, markets and diets to identify potential entry

Figure 1 details the labeling and numeration of Four Cell Axes for Locally Available Agricultural Biodiversity (left) and Markets and Diets (right). Table 2 categorizes each cell in terms of relative abundance within the community. The terms "Diffused" and "Specialized" may refer to species that are abundant in the community, but differentiated in the dispersion across households.

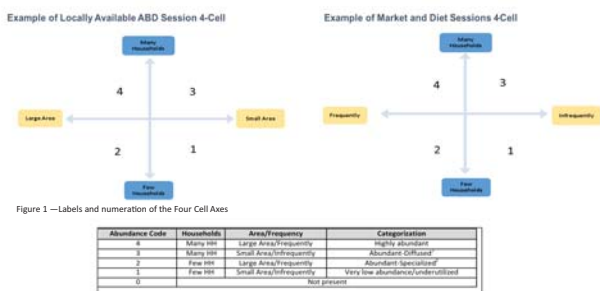


Figure 1 - Labels and numeration of the Four Cell Axes

Results

Underutilized Food Groups

Species Richness in each component as reported in the landscape (all ethnic groups combined) is detailed in table 2 below.

| | Available | Sold | Purchased | Consumed (Diet) |
|-------------------|-----------|------|-----------|-----------------|
| Number of Species | 256 | 202 | 229 | 265 |

Table 2 - Species Richness across the landscape

- 93 species of fruits and vegetables were produced in the landscape but only 17% (n=16) were dark green leafy vegetables and 11% (n=10) were vitamin-A rich.
- Legumes accounted for only 4% of species diversity in production, markets and diets.
- Three target food groups (Dark Green Leafy Vegetables, Vitamin-A rich fruits and vegetables and legumes) were chosen for nutrition interventions due to their underutilization in the landscape and potential to improve dietary diversity. Table 3 details the average abundance and total species richness (R) reported for these food groups per component. Landscape Average Abundance was calculated by the mean

| | Available | | Sold | | Purchase | | Diet | |
|---------------------------------------|-------------|----|-------------|----|-------------|----|-------------|----|
| | Avg. Abund. | R | Avg. Abund. | R | Avg. Abund. | R | Avg. Abund. | R |
| Dark Green Leafy Vegetables | 1.38 | 13 | 0.85 | 12 | 1.08 | 12 | 1.46 | 13 |
| Legumes | 0.90 | 9 | 0.70 | 7 | 1.10 | 9 | 1.40 | 10 |
| Vitamin A, Rich Fruits and Vegetables | 0.92 | 12 | 0.92 | 11 | 0.92 | 10 | 1.50 | 12 |

Table 3 - Average Abundance and Species Richness (R) of target food groups

Conclusion

The Four-Cell method is a useful tool in mapping the role of agricultural biodiversity to identify underutilized food groups in a landscape in order to target food-based approaches that promote diversified production and diversified consumption of locally available nutritious foods. It is also useful in mapping the multiple uses of agricultural biodiversity as well as species that can potentially be accessed through diversification of production and coping mechanisms, such as preservation and regular market access, to ensure stability of access to diverse, nutritious species. By gaining this general understanding of the role of agricultural biodiversity in food systems of local communities, and how they may differ within a single landscape, it is possible to determine potential entry points that may be appropriate for each community in order to improve dietary diversity and food and nutrition

Results

Food System Components

Venn diagrams were used to analyse species richness reported in each component by Hmong (left) and Thai (right) ethnic groups (Figure 2). The numbers in each circle represent the species richness in each component, and the overlap of circles represents the overlapping uses of species. The food system of the Hmong may be more subsistence in nature, demonstrated by the majority of species (n=78) being produced for consumption, and lower species richness in markets (Purchase and Sold), whereas the Thai report greater species richness purchased and sold, suggesting greater market access. The Thai report purchase and sale of many of the same species, suggesting they may be using the market as a coping mechanism, whereas the Hmong reported preservation of foods as a coping

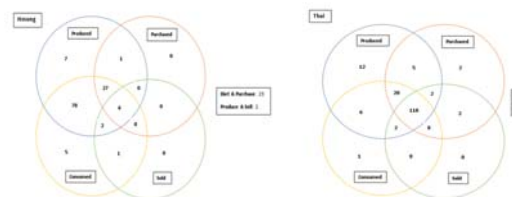


Figure 2 - Venn Diagrams representing species richness per food system component in Hmong (left) and Thai (right) ethnic groups

Table 4 displays Species Richness (R) Available, Purchased and Sold the landscape and per ethnic group and Diversity in Production (% Available, Sold (% Sell), and Purchased (% Purchase) by each ethnic group, in order to view the percentage of species that each ethnic group utilises in comparison with total species richness in the landscape.

| | Landscape Richness | Thai | | Kinh | | Khomu | | SinhMun | | Hmong | |
|-----------|--------------------|------|-----|------|-----|-------|-----|---------|-----|-------|----|
| | | % | R | % | R | % | R | % | R | % | R |
| Available | 256 | 69% | 176 | 68% | 174 | 68% | 173 | 67% | 171 | 33% | 86 |
| Sell | 202 | 68% | 137 | 47% | 95 | 51% | 103 | 35% | 70 | 5% | 11 |
| Purchase | 229 | 68% | 155 | 73% | 167 | 36% | 82 | 43% | 99 | 20% | 46 |

Table 4 - Species Richness (R) Available, Purchased and Sold the landscape and per ethnic group and Diversity in Production (% Available), Sold (% Sell), and Purchased (% Purchase)

For the Diet component, two dietary proxies, namely *Landscape* and *Community*, were created to compare consumption and access. By comparing the species richness in the diet and richness reported by each community, it is possible to investigate food groups in which communities are not consuming all of the foods to which they have access. By comparing the species richness in the diet to species richness reported in the landscape, it is possible to view the percentage of species and foods consumed by each community in comparison with species richness that can potentially be accessed within the landscape.

| Diet | R | Thai | | Kinh | | Khomu | | SinhMun | | Hmong | |
|-----------|-----|------|-----|------|-----|-------|-----|---------|-----|-------|-----|
| | | % | R | % | R | % | R | % | R | % | R |
| Landscape | 271 | 58% | 156 | 67% | 186 | 70% | 189 | 71% | 192 | 40% | 107 |
| Community | 188 | 83% | 156 | 90% | 207 | 95% | 199 | 91% | 211 | 96% | 111 |

Table 5 - Summary of two dietary proxies for five ethnic groups.

Examples of Possible Food-Based Nutrition Interventions Identified using Four-Cell Approach

- Increase year-round availability of target food groups (Dark Green Leafy Vegetables, Legumes, and Vitamin-A rich species) through improved production methods, improved storage and preservation, diversification of species use, and nutrition calendar planning
- Farmer-to-Farmer learning schools for sharing management techniques
- Diversification of (alternative) coping mechanisms used to improve availability and access of target food groups (markets, food preservation, collecting wild foods)
- Nutrition education/Participatory cooking classes to:
 - Increase awareness of nutritional benefits of species in target food groups to incentivize increased use of these foods in the diet