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Leveraging nutrition objectives and food traditions for agroecology

Benefits of underutilized crop species to improve nutrition

Despite progress in mainstream agriculture, roughly 800 thousand people remain hungry and 2 billion suffer from micronutrient deficiencies, while overweight and obesity rates are increasing. Neglected and underutilized species (NUS) often have better nutrient content than generally adopted imported, counterparts and contain health-protective secondary metabolites which other crops might have lost during breeding. A highly diverse range of traditional foods can be considered NUS, including nutritious fruits, vegetables, nuts and pulses or whole grains that are currently consumed in insufficient quantities by populations to ensure protection against diet-related chronic diseases. Diet modelling studies have shown that integrating NUS in local diets could contribute to closing nutrient gaps and reduce the cost of nutritious diets[4].

Agroecology offers a holistic approach to help promote NUS production, marketing and consumption. Based on the 13 agroecological principles and focused on NUS consumption and nutrition: (i) agroecology fosters traditional knowledge, while substantial NUS production, harvesting, preservation, preparation and consumption knowledge remains confined to local populations[3]; (ii) agroecology promotes production diversity, including NUS production, which contributes to dietary diversity and thus quality; e.g. diversifying with traditional leafy vegetables, legumes and poultry in a community-led project significantly increased young child dietary diversity in Kenya[1]; (iii) agroecology—through its movement function—promotes social capital which in turn fosters: (a) exchange of NUS seeds and foods; (b) sharing of knowledge on NUS characteristics such as organoleptic qualities, recipes and health benefits; (c) dissemination of general information on healthy diets; (iv) agroecology promotes networks and alternative inclusive markets for nutritious NUS products to reach consumers in an equitable and safe way; and finally (v) in a study in Ecuador, agroecology fostered consumption of self-grown produce, thereby reducing purchases of ultra-processed unhealthy foods in convenience stores[2].

▲ *Display of food agrobiodiversity from the Cachilaya community, Bolivia.* © *G. Meldrum/Bioversity International*

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For further information

(1) Boedecker J., Oduor F, Lachat C., Van Damme P., Kennedy G., Termote C., 2019. Participatory farm diversification and nutrition education increase dietary diversity in Western Kenya. *Maternal and Child Nutrition*, 15(3): e12803.

(2) Deaconu A., Berti P.R., Cole D.C., Mercille G., Batal M., 2021. Agroecology and nutritional health: a comparison of agroecological farmers and their neighbors in the Ecuadorian highlands. *Food Policy* (in press).

(3) Padulosi S., Thompson J., Rudebjer P., 2013. *Fighting poverty, hunger and malnutrition with neglected and underutilized species (NUS): needs, challenges and the way forward*. Bioversity International, Rome.

(4) Sarfo J., Keding G.B., Boedecker J., Pawelzik E., Termote C., 2020. The impact of local agrobiodiversity and food interventions on cost, nutritional adequacy, and affordability of women and children's diet in northern Kenya: a modeling exercise. *Frontiers in Nutrition*, 7: 129. doi.org/10.3389/fnut.2020.00129

Diversifying crop and livestock production and arboriculture to foster varied diets and ensure food and nutrition security

African farm households are often hampered by food and nutrition insecurity, even in regions with relatively high agricultural production levels. This is the case in the cotton and cereal growing areas of Mali and Burkina Faso, where food systems do not provide enough quality food for farmers to stay healthy[1]. This situation—which is surprising at first glance—could be explained by: (i) the increase in women's farming work, which comes with new responsibilities without any direct benefits because of their subordinate status in the household; (ii) the reduction in the amount of space available for new cropfields and the limited rights of access to natural areas where food may be harvested; (iii) the specialization of production systems; and (iv) the lack of healthy food products with a sufficiently high nutrient content while remaining affordable on rural consumer markets[2].

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▲ *Women farmers in a cashew orchard, Burkina Faso.* © *A. Lourme-Ruiz, 2014*

These different factors are conducive to a poorly diversified diet. Two recent studies conducted in western Burkina Faso revealed that the daily diet of 80% of women does not meet their micronutrient needs[3]. Women living on farms with more nutritionally diversified production (including crops and agroforestry trees) generally have a more varied diet (self-consumption). Yet since access to markets or to natural areas cannot offset the lack of crop diversity, women on specialized farms (cotton) have a less diversified diet[4]. **In these regions, it is recommended that—to develop farming systems that are 'nutrition-sensitive' or at least likely to adequately feed women farmers—crops should be diversified according to their nutritional features.** For instance, market garden crops should be promoted when water supplies are available, trees bearing highly nutritional seeds could be planted, and leguminous crops such as cowpeas could be produced in the light of their many agronomic benefits (atmospheric nitrogen sequestration, animal feed). More generally, agricultural biodiversity has nutritional, agronomic and ecological benefits, but systems for assessing the services provided by this agrobiodiversity are still siloed and would warrant interdisciplinary dialogue (agronomy, nutrition, ecology)[4].

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For further information

(1) Dury, S., Bocoum, I., 2012. Le paradoxe de Sikasso (Mali) : pourquoi « produire plus » ne suffit-il pas pour bien nourrir les enfants des familles d'agriculteurs ? *Cahiers Agricultures*, 21(5): 324-336.

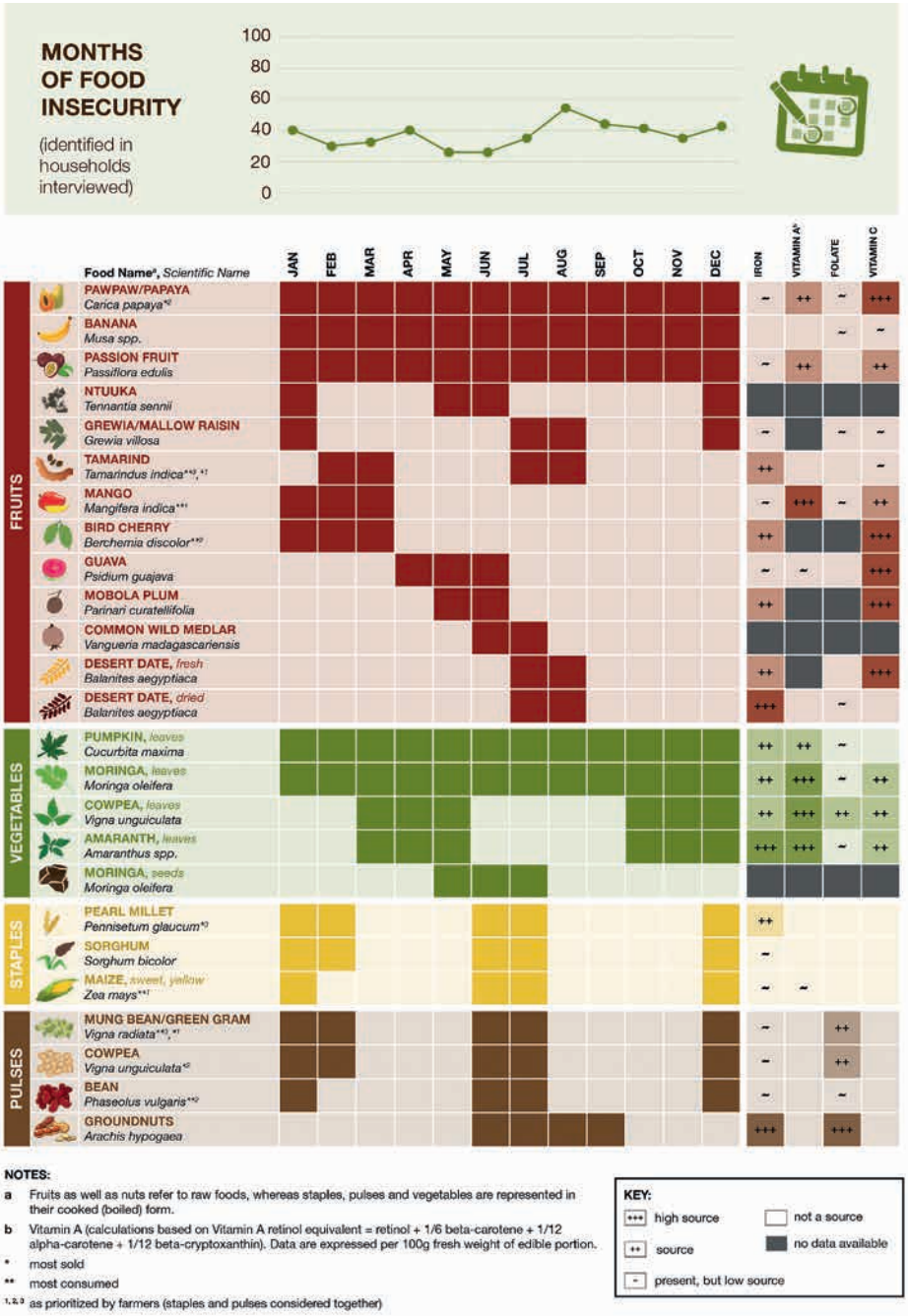
(2) Lourme-Ruiz A., Maugérard E., 2014. *Le paradoxe des Hauts Bassins : produire plus pour nourrir mieux ?* Film documentaire (41 min), CIRAD, Montpellier, France. https://vimeo.com/120670833

(3) Lourme-Ruiz A., Dury S., Martin-Prével Y., 2016. Consomme-t-on ce que l'on sème ? Relations entre diversité de la production, revenu agricole et diversité alimentaire au Burkina Faso. *Cahiers Agricultures*, 25(6): 11.

RELAX project, Promoting resilience in African rural households: Food systems at a crossroads: https://relax.cirad.fr/le-projet/presentation

(4) Lourme-Ruiz A., Dury S., Martin-Prével Y., 2021. Linkages between dietary diversity and indicators of agricultural biodiversity in Burkina Faso. *Food Security*. https://doi.org/10.1007/s12571-020-01137-5

Delivering diversified diets year-round with customized food tree portfolios



▲ ***Customized food tree portfolio for Igambe Ngombe, Tharaka Nithi County, Kenya.***
A diversity of food tree species, along with complementary vegetable, pulse and staple crops are prioritized with local communities, and mapped for their months of seasonal availability, and micronutrient values to address seasonal food harvest and micronutrient gaps in local diets. © ICRAF

Smallholder food production in sub-Saharan Africa is dominated by starchy staple crops. The availability of micronutrient-rich crops like fruits and vegetables is highly season-dependent, which is one reason for the low consumption. Limited value chain infrastructure, issues of affordability and lack of consumer awareness also hamper adequate consumption. Trees provide almost 60% of fruits globally, constituting an important supplier, particularly in local food systems. When considering production seasonality, tree food portfolios could be promoted to ensure year-round harvests and deliver key micronutrients for diets[1]. Through an iterative process, portfolios are codeveloped with local communities based on their species preferences, food priorities, income and other uses, and are customized for site suitability. Standardized tools, including surveys, are used to gather information on farm production diversity and food consumption, in addition to focus group discussions conducted to determine species for inclusion, their months of availability and nutritional value. This agroecological approach helps generate tailored recommendations for the cultivation of a diverse range of food tree species (including underutilized species), along with vegetables, pulses and staple crops. In addition to filling harvest gaps, certain nutrient gaps are addressed by mapping the nutritional value of selected species using food composition data.

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