

Linking Agricultural Production Practices to Improving Human Nutrition and Health

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Dysfunctional food systems, never designed to improve human nutrition and health, are the basis of malnutrition in many poverty stricken human populations. Notably, all food systems are dependent on agricultural systems as the primary source of nutrients entering food systems. Thus, agricultural systems must play a major role in the development of malnutrition globally. If the products produced from farming systems cannot provide all the nutrients (excluding water) required for human life, malnutrition results causing increases in morbidity and mortality rates, losses in worker productivity and stagnation of development efforts in those populations dependent on these systems.

Food security has been the major focus of many strategies to address malnutrition worldwide. Historically, meeting the caloric needs of populations was sufficient to meet global food security goals. However, just focusing on caloric needs alone is not sufficient. Food security programs should include the necessity that all nutrients be met by agricultural systems to redress the increases in malnutrition in mostly resource-poor families dependent on staple food crops for nourishment. “Nutrient security” should be one of the primary goals of food security programs and producing enough nutrients in agricultural systems to meet nutritional needs of all people during all seasons should be the focus.

There are many agricultural tools that can be utilized to increase the output of nutrients from farming systems. In general, well-nourished food crops grown on fertile soils contain more macronutrients, vitamins and micronutrient minerals than nutrient-stressed crops grown on infertile soils. Soil micronutrient mineral status, cropping systems, variety selection (i.e., plant breeding) for micronutrient-dense crops, fertilization practices, some soil amendments and livestock and aquaculture production are important factors that impact the nutrient output of these systems.

A healthy agricultural industry is crucial for providing nutrients to humans. Soil quality and soil fertility have a direct influence on the nutrient levels in food crops. Soil improvements can increase productivity and allow for greater diversity of crops without increasing the area cultivated. Agricultural tools, such as micronutrient-enriched fertilizers, and farming systems designed to meet nutritional needs should be used as sustainable strategies to reduce malnutrition. Plant breeders should include nutritional quality traits as well as yield traits as targets for enhancement when breeding for improved crop varieties. Biofortification is a new strategy that has great potential to help reduce the burden of micronutrient malnutrition globally especially in resource-poor families in rural areas. Clearly, agriculture must be closely linked to human nutrition and health if we are to find sustainable solution to malnutrition.

Currently, maximizing crop production is usually achieved by applying modern agronomic approaches to farming such as by using innovative and useful nutrient, water and pest management practices. However, such approaches, although they are highly effective at increasing productivity, are not directed at increasing nutrient levels in edible portions of food crops to meet human needs. Indeed, only focusing on productivity of staple food crops can cause reductions in the level of micronutrients in those crops through "growth dilution". Obviously, much higher concentrations of certain micronutrients (e.g., iron and zinc) in seeds and grains of major staple food crops (i.e., rice, wheat and maize), beyond the amounts needed for high crop yields, are required to address micronutrient malnutrition in human populations in the Global South. Increasing seed and grain micronutrient mineral concentrations more than that required for maximum yields is an important challenge, and this challenge can be easily and rapidly met by applying micronutrient fertilizers at the right rate, at the right time, in the right place using the right fertilizer source.

Agricultural production practices must be closely linked to human nutrition and health goals at the local, regional, national and international levels if we are to find sustainable solutions to malnutrition, including overt nutrient deficiencies and diet-related chronic diseases. Not only productivity goals and environmental goals must be met through agriculture but also human nutrition and health priorities need to be considered by agriculturalists and policy makers when planning for the future. Furthermore, human nutrition, health experts and policy makers must start to use agricultural tools and strategies to address malnutrition issues. Policies to improve nutrition and health need to include agricultural strategies as primary tools in finding sustainable solutions to malnutrition. Sustainable agriculture can only be achieved when agriculture can provide all the essential nutrients required for human life in adequate quantities to all throughout the year. Importantly, if agricultural systems cannot meet the nutritional needs of the societies and the people they service, than these agricultural systems will not be sustainable. Thus, linking agriculture to human nutrition and health must be accomplished to assure sustainable agricultural systems and human life.