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Development and marketing of perennial grains with benefits for human health and nutrition

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Abstract

“The breeder’s dilemma - the conflict between yield and nutrition” (Morris and Sands, 2006, Nature Biotechnology) addresses the difficulty of breeding for highly nutritious grains when yield is the predominant selection criterion. Perennial grasses, and in particular those that have already been used as food sources by indigenous peoples, offer an opportunity to develop nutritious grain crops from genetic resources that have not been subjected to rigorous selection for yield. Our team has to date, developed two such crops. One is based on “Indian rice grass” (*Achnatherum hymenoides*) that was used by indigenous people in the Western United States. Grain from this perennial grass was consumed as a staple as early as 7,000 years ago, long before maize was cultivated. The grains are smaller, and much higher in protein and in the content of essential amino acids compared to wheat. These seeds shatter and have vernalization traits that suggest they have not been domesticated in the modern agronomic sense. The grain can be ground into a dark and flavorful flour that was marketed as “Montina – a gluten free grain.” “Timtana” gluten-free flour is derived from perennial timothy grass seed (*Phleum pratense*) and it too is high in protein and flavorful when used in baking. With much of the world covered by perennial grains prior to agricultural development, there should be many more crops to develop as “new” emerging crops. A promising search strategy might be to focus on where baking ovens and/or ancient villages were once located. Collection of seeds of perennial plants from such locations may be particularly rewarding. Selection criteria might include several nutritional traits including high protein value, low glycemic index, low phytic acid content, high omega-3 levels and absence of ATI’s (amylase-trypsin inhibitors).