7

Genetic Resources and Breeding of *Amaranthus**

D. M. Brenner
North Central Regional Plant Introduction Station,
Department of Agronomy,
Iowa State University,
Ames, Iowa 50011-1170

D. D. Baltensperger
Panhandle Research and Extension Center,
University of Nebraska,
Scottsbluff, Nebraska 69361

P. A. Kulakow
Department of Agronomy,
2004 Throckmorton Plant Science Center,
Kansas State University,
Manhattan, Kansas 66506-5501

J. W. Lehmann
Amaranth Technology, Inc.,
2611 Schaeffer Dr SW,
Cedar Rapids, Iowa 52404

R. L. Myers
Jefferson Institute,
601 W. Nifong Blvd, Ste. 1,
Columbia, Missouri 65203

M. M. Slabbert
Biotechnology Division,
Agricultural Research Council-Roodeplaat,
Vegetable and Ornamental Plant Institute,
Private Bag X293,
0001 Pretoria,
South Africa

B. B. Sleugh
Department of Agronomy,
Iowa State University,
Ames, Iowa 50011

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I. INTRODUCTION
   A. Historical Review
   B. Commercial Production and Importance
II. BOTANY
   A. Taxonomic Keys
   B. Some Taxonomic Problems
   C. Studies of Species Relationships with Molecular Techniques
   D. Floral Biology
   E. Cytology and Cytogenetics
   F. Genetic Structure
III. GENETICS AND BREEDING
   A. Germplasm Resources
      1. Germplasm Collections
      2. Gene Pools and Wild Species
      3. Landraces
      4. Major Genes
   B. Breeding Techniques
      1. Overcoming Seed Dormancy
      2. Handling Plants
      3. Cross-pollination Procedures
   C. Breeding Objectives for Grain Amaranths
      1. Grain Harvestability
      2. Seedling Vigor
      3. Pest Resistance and Tolerance
      4. Grain Yield
      5. Seed Weight
      6. Grain Maturity Classes
      7. Taste and Nutrition
      8. Seed and Plant Color
      9. Abiotic Stress Tolerance
   D. Breeding Objectives for Vegetable, Forage, and Ornamental Amaranths
   E. Breeding Objectives for Novel Uses
   F. Other Breeding Considerations
      1. Phenotypic Plasticity
      2. Heterosis and Male Sterility
      3. Mutations
      4. Polyploidy
      5. Biotechnology
IV. THE CULTIVAR TYPES
   A. Grain
   B. Forage
      1. Introduction
      2. Yield
      3. Feeding Trials
      4. Anti-nutritional Factors
   C. Vegetable
      1. Nutritional Value
      2. Food Use
      3. Morphology
      4. Species
      5. Production

I. INTRODUCTION

The cultivated amaranths (*Amaranthus* sp.) are used for food grain, leafy vegetables, forage, ornamental gardening, and other potential uses. The wild species include some weeds, and wild non-weeds. All the amaranths are broad-leaf warm-season annuals.

A. Historical Review

The domestication of the grain amaranth species is not fully understood, but Sauer (1993) investigated this question in the 1950s. The earliest dating of amaranth as a domesticated grain crop comes from archeological digs at a cave in Tehaucan, Puebla, Mexico, where seeds of *Amaranthus cruentus* were dated as 6,000 years old, although Sauer (1993) notes that initial domestication could have occurred much earlier and in different locations. The oldest known seeds of *A. hypochondriacus* appeared in the same caves about 1500 years BP, although domestication may have occurred earlier.

Sauer (1993) believes the progenitor of *A. cruentus* to be *A. hybridus*, which is currently found over a wide range of plains and mountains in North, Central, and South America. *Amaranthus hypochondriacus* has characteristics of both *A. cruentus* and the wild species *A. powelli*, and may be a hybrid of the two. The origin of the third species of grain amaranth, *A. caudatus*, is more uncertain to Sauer. *Amaranthus caudatus* has been used in South America's Andean highlands (Peru, Bolivia, Argentina) for centuries (Early 1992; Sauer 1993), but the timing and location of domestication are unknown. *Amaranthus caudatus* may have been domesticated from an early introduction of *A. cruentus* that then crossed with a wild *Amaranthus* in the region (Sauer 1993). Chan and Sun (1997) found evidence with isozyme and RAPD markers suggesting that *A. hybridus* is a common ancestor to all the cultivated grain species.

The archeological record shows domesticated amaranth seeds appearing over a wide range, from Argentina into the southern United States (Sauer 1993). Grain amaranth was used by various Indian groups in the southwestern United States, and light-colored *A. hypochondriacus* seeds