Dear SorghumBase community,

As 2025 draws to a close, we're pleased to reflect on the science, resources, and community activities featured on SorghumBase this year. From advances in understanding the genetics of drought-resilience and agronomic traits to innovative applications of sorghum in health, materials, and fermentation, it's been a dynamic and productive year for the sorghum research community.

Research Highlights from the Sorghum Community

Research shared on SorghumBase in 2025 reflects a community that is simultaneously deepening its understanding of sorghum biology and expanding the crop's relevance in the response to environmental pressures, agronomic goals, and new end uses. Across more than eighty research-focused posts this year, several clear themes emerged, highlighting where scientific efforts were concentrated and how research approaches have evolved.

Adaptation to drought, heat, and osmotic stress

Multiple studies aimed to understand and investigate the molecular and regulatory mechanisms that allow sorghum to maintain productivity under water limitation.

- Evolutionary diversification and stress-responsive expression of **polyamine oxidase genes** contribute to drought tolerance (link).
- **Stomatal behavior and aquaporin haplotypes** are linked to sustained photosynthesis under stress (link).
- Comparative analyses of C3 and C4 crops clarified why sorghum maintains **photosynthetic stability** under drought relative to wheat (link).
- Ethiopian sorghum landraces identified loci associated with **nodal root traits and root depth** that contribute to drought resilience in water-limited environments (link).

Together, these studies reflect a growing interest in multi-scale stress biology, integrating gene families, physiological traits, and whole-plant performance experimental systems.

Genetic Dissection of Complex Agronomic traits

Several posts revisited classic traits using modern genomic tools such as GWAS and pangenomics.

- Pangenome-enabled analyses of the canonical **dwarfing gene *dw3*** identified stable alleles with reduced height reversion, offering new options for breeding programs seeking reliable plant architecture (link).
- Work on the **multiple-grain spikelet trait** demonstrated how variation in the transcription factor *MGS1* increases grain number per panicle, directly linking developmental regulation to yield potential (link).

Environmental Interactions, Resource Traits, and Tradeoffs

Beyond drought and yield, the community explored sorghum's role in environmental resilience and resource use.

- A study on **cadmium phytoremediation** identified genotypic variation in ABC transporters influencing heavy-metal uptake and translocation, highlighting sorghum's potential as a remediation crop (link).
- Other work examined **root–microbe interactions**, showing how sorgoleone levels modulate arbuscular mycorrhizal symbiosis and phosphorus uptake (link).
- Grain quality and composition were also addressed by tracking the **developmental dynamics of phenolic compounds and antioxidant capacity**, linking genotype and environment to nutritional traits (link).

From GWAS to Function: Post-GWAS and Integrative Approaches

Several 2025 posts highlighted a growing emphasis on post-GWAS interpretation and functional prioritization. Rather than treating GWAS as an endpoint, researchers integrated association results with expression data, biochemical pathways and genome structural diversity to translate signals into mechanistic and breeding-relevant insights. One highlighted paper focuses on post-GWAS methodology, describing a generalizable post-GWAS algorithm.

- The **Sequential SNP Prioritization Algorithm** (SSPA) offers a framework for ranking trait-associated variants using correlation-based metrics, helping to bridge the gap between statistical associations and biological insight (link).

A Globally Distributed Research Community

The research highlighted in 2025 reflects a strong international sorghum community, with studies conducted across the Americas, Africa, Asia, Australia and Europe. Ethiopian and other African landraces featured prominently in investigation of drought adaptation and root traits/architecture, while multi-institutional collaborations supported advances in genomics, proteomics, and computational analysis. This global footprint underscores sorghum's importance in both food-secure and climate-vulnerable regions and highlights the deeply collaborative nature of the field.

Special Topics: Sorghum Beyond the Field

In parallel with research highlights, SorghumBase's Special Topics series showcased sorghum's expanding role beyond traditional production systems, emphasizing value-added applications and cross-disciplinary innovation:

- **Health and nutritional benefits**: Studies explore bioactive compounds, dietary fiber, and low glycemic index properties.
- **Food science and baking**: Research advanced the use of sorghum in gluten-free and composite flours which improved texture and sensory qualities.
- **Fermentation systems**: From African traditional beers to Chinese baijiu, this post focuses on how genetics, grain traits, and microbial communities intersect to shape flavor and quality.
- **Kafirin**: Sorghum's major storage protein emerged as a promising material for bioplastics, nanomaterials, and cosmetic applications.

Community, Conferences, and Seminars

Throughout 2025, SorghumBase continued to support and spotlight community events that foster collaboration and knowledge exchange across the sorghum research community.

- **CSI Seminar Series**: The Center for Sorghum Improvement seminars series featured talks spanning a variety of topics, including whole grain bioactives and personalized nutrition, defenses against fall armyworm, public–private partnerships for trait delivery, biological nitrification inhibition, transpiration efficiency and sowing density, linking sorghum production to groundwater outcomes. (link)
- **Major conferences**: SorghumBase covered community participation in:
    - The **Sorghum/Millet Workshop at PAG32**. (link)
    - **Plant Biology 2025**, with a recap of sessions, posters, and networking opportunities at this flagship plant science meeting. (link)
    - The **18th International Biocuration Conference**, emphasizing the central role of biocurators and data infrastructure in life science research. (link)
    - **The Advances in Genome Biology and Technology (AGBT) Agricultural Meeting 2025,** convened leading genome researchers from around the world to discuss the integration of genomics in agriculture, highlighting research across both livestock and plant systems. (link)
- **Looking ahead: 2026 events**:
    - **Plant Animal Genomes (PAG33)** in San Diego (Jan 2026).
    - SorghumBase will present an update at the **CSI seminar** (Feb 10, 2026).
    - The **Global Sorghum Conference** in Lubbock, Texas (Sept 14–18, 2026).

Thank you for being part of the SorghumBase community and for all your continued contributions to advancing sorghum research, breeding, and application. We look forward to sharing more science, tools, and stories with you in 2026.

With best wishes,

The SorghumBase Team