Sorghum, together with other food crops, has been an essential part of the human diet for thousands of years. This ancient grain is rich in protein, fiber, and other nutrients, making it a valuable contribution to a balanced diet. Sorghum has been cultivated for its seeds, grains, and by-products, which are used in various applications.

### Samples
- 57 sorghum samples varied in their physical characteristics and nutritional content were used in the study.
- 48 samples from the USDA sorghum association collection contained a variety of characteristics.
- 20 samples were chosen to study the relationship between flavor and sorghum varieties.

### Samples preparation
- Samples were prepared and presented to panelsists in 10 applications: cooked grains, porridge, cookies, muffins, and extruded products.
- Samples were presented and served as cooked grain and cookies.
- All sorghum samples were used in blinded with 3-digits codes.

### Evaluation procedure
- 6 highly trained panelists participated in the study.
- The panel used the Consensus Profile method.
- Samples were evaluated using a 5-point scale based on 20 sorghum varieties.

### Validation of the lexicon
- Applying the lexicon to characterize the flavor profile of sorghum varieties under multiple applications.

### Attributes
- **Flavor**: The flat flavor note associated with raw or processed starch based grain products such as wheat, rice, oats, and other grains.
- **Moisture**: A slightly brown, moist, nutty, and starchy flavor associated with cooked bread and cookies.
- **Cardboard**: A flat flavor note associated with cardboard or paper packaging that may be metal, somewhat sour, bitter, and salty notes.
- **Bake**: A flat flavor note associated with baked products and may include sweetness, freshness, and characteristics such as toasted, nutty, caramelized and sweet.
- **Spice brown**: A blend of slightly pungent, brown, spicy aromatics.
- **Sweet**: Aromatic aromatics associated with the impression of sweet substances.
- **Musty-Dusty**: A rich, full-bodied, brown, sweet aromatic, which may include the characteristic notes of vanilla and caramelized.
- **Leavening**: The flat, metallic, somewhat sour, bitter and salty aromatics associated with baking soda and/or baking powder in baked products.

### Oil-Heated
- **Buttery**: Dairy aromatic/favours associated with cooked sweet cream. May also include a slightly salty note and occur in both natural and non-natural products.
- **Petroleum**: Specific chemical aromatics/flavors associated with crude oil and its refined products that have heavy oil characteristics.
- **Eggy**: Aromatic/flavors associated with cooked whole chicken eggs, with savory, salty, buttery, and sulfur overtones. May also include sweet, metallic, and cardboard notes.
- **Umani**: Savory, salty, and somewhat flat, brothy aromatics/flavors associated with salts from cooked seafood, meat, and/or vegetables.
- **Overall**: Sharp, pungent aromatic/flavors associated with fresh green/plant/vegetable matter such as parsley, spinach, pea pod, fresh cut lettuce, spinach, and celery.

### Nutty
- A combination of slightly sweet, brown, woody, oily, musty, bitter and aromatic aromatics commonly associated with nuts, seeds, beans, and grains.

### Woody
- The sweet, brown, moist, dark/aromatic flavor associated with dry, freshly cut wood.

### Musty-Dusty
- Dusty, musty paper.
- **Cocoa**: A brown, sweet, dusty, moist, bitter aromatic associated with cocoa bean, powdered cocoa and chocolate bars.
- **Leather**: Warm, sweet, aromatics associated with tanned animal hides. Characteristics may include musky perfumery, honey, woody, tobacco, resinous, and smoky notes.

### Bran
- Light dusty brown grain-like aromatic/flavor impression that may include characteristics such as slightly raw, sweet, and bitter.

### Corn-Like
- Sweet, musty, light brown, and slightly sour aromatics/flavors, accompanied by earthy and starchy characteristics.

### Wheat Like
- Dusty brown, nutty aromatic/flavors that may include light raw or caramelized notes, as well as a slightly metallic note.

### Sweet
- A fundamental taste factor of which sucrose is typical.

### Sour
- The fundamental taste factor associated with a citric acid solution.

### Bitter
- The fundamental taste factor associated with a caffeine solution.

### Salty
- The impression of slightly咸味 gastronomic such as salt, copper, and silver ions.

### Metallic
- Astringent aromatics commonly associated with nuts, seeds, beans, and grains.

### References and Intensity
- **PI576399**
- **PI576428**
- **PI576430**
- **PI534070**
- **PI534092**
- **PI533948**
- **PI534137**
- **PI597957**
- **PI576380**
- **PI533766**
- **PI656046**
- **PI656115**
- **PI576428**
- **PI576380**
- **PI533766**
- **PI656046**

### Conclusion
- A sensory lexicon with 27 attributes was identified, defined, and referenced by the trained panel to characterize the flavor profile of sorghum. The study used a Consensus Profile method.
- The lexicon was applied to describe the flavor profile of sorghum and its by-products.

### References

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**Figure 5. Principal Component Analysis (PCA) of the panel evaluated for flavor attributes of multiple sorghum cookie samples.** Sorghum cookie samples were greatly differentiated from each other.

**Table 1. Principal Component Analysis (PCA) of the panel evaluated for flavor attributes of multiple sorghum cookie samples.** Sorghum cookie samples were greatly differentiated from each other.