COFFEE SCIENCE FOUNDATION

Coffee Science Foundation Request for Proposals

Topic: Understanding Physical Defects in Green Coffee and Their Impact
Due By: 31 May 2024

Introduction: For over 20 years, the Specialty Coffee Association has published a schema, called the SCA Green Coffee Classification, which defines certain physical attributes of coffee as "defective". "Defect" is defined as a material property of the green or roasted coffee beans that is broadly seen as negative. The Coffee Science Foundation seeks to investigate these "defects" and their impact in the context of modern sensory, chemical, and toxicological science, in order to provide high-quality information to the SCA and inform their upcoming revision of the SCA Green Coffee Classification and the Coffee Value Assessment.

Objective: To evaluate the 17 defects specified in the SCA classification system, and discover any other important "defects" which may exist in commercial coffee. Evaluation should include the characterization of each defect's impact to coffee flavor and safety through sensory analysis, chemical analysis, and insight into any safety hazards these defects may impart. The SCA classification system is explained in detail in attachments A, the Washed Arabica Green Coffee Defect Poster, and B, the SCA Washed Arabica Green Coffee Defect Handbook.

Expected Outputs:

- Approximately 1 year of academic research led by PhD researchers trained in chemistry, agriculture, chemical engineering, food or sensory science, or other relevant disciplines.
- A research report documenting the methodology, findings, recommendations for including or excluding specific defects, and areas for continued research.
- 1-3 Academic Papers published in relevant journals
- Industry-facing dissemination outputs including webinars, presentations, plain language articles, posters, and/or podcasts.

Qualifications:

- Proposals must be submitted in English.
- Primary investigator(s) must have a proven record of accomplishment in scientific investigation in relevant disciplines.

Key Issues:

1. It has been observed that some attributes considered defects in the SCA Classification Method may have a negligible effect on sensory or other consumer-relevant attributes. We seek to test these observations.

2. In cases where the defect leads to a specific sensory attribute, we seek to identify that attribute and define it in the context of the SCA Flavor Wheel/Lexicon.
3. It is possible that some physical defects might present food safety concerns. If so, we'd like these to be identified. Though this is not a health study per se and we do not anticipate any actual toxicological research, identifying chemical or biological hazards is of interest.
4. We seek to expand this concept outside of "washed Arabica" to other commercially relevant processes and species of coffee, including *coffea Canephora*, fruit-dried coffee (aka "naturals"), and mucilage-dried coffee (aka "semi-washed", "honey", etc.)

Budget: $125,000 USD

Submission Guidelines:
The proposal submissions should include a synopsis that describes the work in sufficient detail to be evaluated by reviewers and be written with the following sections:

I. Cover sheet
    a. Organizational, primary investigator, collaborators, and other personnel
II. Project summary
    a. Title, synopsis
III. Background with supporting references
IV. Proposed research plan based on key questions
V. Relevant materials and methods
VI. Expected deliverables
VII. Proposed timeline
VIII. Estimated budget with justifications

Proposal review criteria include but are not limited to:

- Expertise and qualifications of primary investigator and researcher(s)
- Research plan is well-reasoned and organized
- Relevance and connection to the coffee industry
- Intellectual merit
- Existing infrastructure, facilities, or other institutional support
- Research team includes on-site researchers or support teams in coffee-producing countries

CSF Contacts: Any questions or replies to:

Peter Giuliano, Chief Research Officer, peterg@sca.coffee

COFFEE SCIENCE FOUNDATION

Specialty Coffee Association

The Washed Arabica Green Coffee Defect Poster

Specialty Grade

Green Coffee Defect Count (350 gram sample)
0 category 1 defects allowed,
≤ 5 category 2 defects allowed

Quaker

Roasted Coffee Defect Count (100 gram sample)
0 quakers allowed

Full Black Bean
1 bean ≥ ½ black = 1 full defect

Full Sour Bean
1 bean ≥ ½ Sour = 1 full defect

Dried Cherry/Pod
Bean partially or fully enclosed in dark outer fruit husk.

Fungus Damaged Bean
Exhibiting yellowish or brownish fungal attack.

Foreign Matter
Any non-coffee item, such as sticks or stones

Severe Insect Damage Bean
With three or more insect perforations.

Standard Method of Classification

Sample Weights:
Green Coffee - 350 grams | Roasted Coffee - 100 grams.

Green Coffee Moisture Standard:
Specialty grade washed arabica green coffee shall be ≥ 10% and ≤ 12% moisture upon import.

Green Coffee Water Activity Standard
Specialty grade washed arabica green coffee shall be < 0.70 Aw.

Sample Weights for Classification Analysis
Representative homogenized product samples shall be used for analysis.
Green Coffee - 350 grams, Roasted Coffee - 100 grams.

Bean Size:
For buyer's reference and not part of the SCA specialty grade specification. No more than 5% variance from purchase contracted specification, measured by retention on traditional round-holed grading screens.

Table of Defect Equivalents:

Category 1 Defects	Full Defect Equivalents	Category 2 Defects	Full Defect Equivalents
Full Black	1	Partial Black	3
Full Sour	1	Partial Sour	3
Dried Cherry/Pod	1	Parchment/Pergamino	5
Fungus Damaged	1	Floater	5
Foreign Matter	1	Immature/Unripe	5
Severe Insect Damage	5	Withered	5
		Shell	5
		Broken/Chipped/Cut	5
		Hull/Husk	5
		Slight Insect Damage	10

Roasted Coffee Quaker Count Standard:
Specialty Grade - No quakers allowed

Green Coffee Defect Classification:
When two defects are found simultaneously in one coffee bean, the defect that most impacts the quality of the cup takes precedent over others. Each defect type is counted individually, the grader shall not combine defect counts from different types to calculate a combined defect equivalent. Malformed or misshaped beans are not defects, only the defects presented in this guide are categorized as category 1 or category 2 defects.

Flavor Characteristics:
Cupping is a professional technique for evaluating coffee. When cupping specialty coffee, sample must exhibit distinctive attributes in the areas of Fragrance/Aroma, Flavor, Acidity, Body and Aftertaste, as determined between buyer and seller. Coffee must be free from odors, faults and taints.

Partial Black Bean
3 beans, each < ½ black = 1 full defect

Partial Sour Bean
3 beans, each < ½ Sour = 1 full defect

Parchment/Pergamino Bean
Partially or fully enclosed in dried parchment.

Floater Bean
Light in color and low in density.

Immature/Unripe Bean
Underdeveloped and greenish with silverskin attached.

Withered Bean
Lightish green bean with a wrinkled surface.

Shell
Part of a malformed bean consisting of a cavity.

Broken/Chipped/Cut
A cut bean or fragment.

Hull/Husk
Fragment of a dried cherry/pod

Slight Insect Damage Bean
With less than three insect perforations.

Green Coffee Color

Visual inspection of green coffee is for buyer's reference only and not part of the SCA specialty grade specification.
Unroasted coffee's color ranges from Blue-Green to Brownish depending upon origin, or age.

Blue-Green | Bluish-Green | Green | Greenish | Yellow-Green | Pale Yellow | Yellowish | Brownish

Specialty Coffee Association | sca.coffee