

GUIDELINES FOR CONSTRAINT ANALYSIS IN SUGARCANE

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Sugarcane productivity is influenced by a complex interaction of biological, environmental and management factors. Identifying and addressing these constraints is important for improving yields, sustainability and profitability. Constraint analysis can also be subjective, with different perspectives between the extension or productivity officer and the grower, which may lead to inconsistent diagnoses and recommendations.

These guidelines have been developed to support a consistent and evidence-based approach. They bring together field observations, grower input, diagnostic testing and environmental information to help extension officers assess the most likely causes of low yields or reduced production in a specific block of cane. They cover the basics but where relevant, the framework may also incorporate spatial and precision agriculture tools such as satellite or drone imagery, soil EC mapping, and elevation mapping.

The guidelines are structured around four key areas:

1. Observations – identifying visible symptoms in plants and fields.
2. Farmer Input – gathering insights from farm records and grower knowledge.
3. Diagnostic Tests – using laboratory analysis to confirm and quantify issues.
4. Environmental Factors – considering external influences such as climate and water management.

By combining these sources of information, extension officers can develop targeted and practical management plans that focus on the most likely causes of productivity constraints

PURPOSE

To provide a consistent framework for extension officers to assess and address productivity constraints systematically, ensuring better adoption of recommendations by farmers.

OBSERVATIONS - PHYSICAL SYMPTOMS AND INDICATORS

Objective: Record visible symptoms of stress or damage on plants, as well as signs of pests and diseases.

Key Areas to Monitor:

- Plant Health: Yellowing, stunting, or unusual growth patterns.
- Pests and Diseases: Presence of pests, fungal growth, or galls.
- Soil Surface Conditions: Waterlogging, compaction, or erosion.
- Weeds: Types, density, and distribution in fields.



Tools/Methods:

- Field observation checklist for common signs.
- Photographic documentation for further analysis.
- Use of satellite or drone imagery (NDVI and other crop indicators)
- Soil EC mapping
- Within block elevation mapping (RTK)

SUGARCANE PEST ASSESSMENT

Objective: Identify pest activity and crop damage early so the impact can be assessed and the right management action considered.

Insect Identification:

- Identifying species such as canegrubs, soldier fly, aphids, borers or leafhoppers.
- Differentiating between harmful pests and beneficial insects (e.g. natural predators).

Population Monitoring:

- Estimating pest density or populations through field surveys.
- Use of traps (e.g. pheromone traps, sticky traps) to monitor specific insect activity.

Damage Assessment:

- Observing and recording feeding damage on leaves, stems, or roots, including severity and estimated production impact.
- Noting symptoms like holes, insect droppings, lesions, or wilting caused by pests.
- Record the severity of infestation, the estimated area affected, and calculated impact on crop performance or yield.
- Where possible, document recurring issues to support trend analysis across seasons, districts and crop types.



Lifecycle Stages:

- Record developmental stages of pests (i.e. larvae, pupae, adults) to determine the best timing for interventions.

Associated Plant Symptoms:

- Link insect presence to observed plant symptoms, such as reduced vigour, stunted growth, or specific patterns of damage.

GROWER INFORMATION

Objective: Gather contextual data from the farmer about management practices, priorities and challenges.

Key Areas to Explore:

- Grower goals and priorities: production goals, risk tolerance, financial constraints, labour availability, and preferred management approaches.
- Farming practices and local knowledge: cultural practices, decision-making processes, and observations from previous seasons.
- Record Keeping: Input use, timing of application, costs, and yields.
- Historical knowledge of crop performance across the farm.
- Mill Performance: Data on sugar recovery and quality.
- Harvesting Practices: Timing, methods, and impacts.
- Varieties used: Suitability for the region, disease resistance.
- Clean Seed Practices: Use of certified or disease-free planting material.

Tools/Methods:

- Structured interviews or standardised questionnaires.
- Grower's shared records.

DIAGNOSTICS - SOIL HEALTH/PHYSICAL PROPERTIES

Objective: Quantify and confirm the presence or severity of specific constraints.

SRA diagnostic services may include:

- Parasitic nematode and Pachymetra counts (Tully laboratory)
- Free-living and parasitic nematode counts (Woodford laboratory)
- Ratoon Stunting Disease (RSD) tests (IRIS Laboratories, Brisbane)
- DNA variety identification (IRIS Laboratories, Brisbane)
- Molecular tests for diseases, as needed (IRIS Laboratories, Brisbane)

Other relevant diagnostic tests may include:

- Soil chemical analysis
- Leaf nutrient analysis
- Soil physical condition tests, where relevant (e.g. dispersion, infiltration, compaction-related indicators)
- Soil biological and soil health tests, where relevant (e.g. soil respiration, labile carbon and related indicators)



Contact SRA's Industry Services Laboratories:

ENVIRONMENTAL FACTORS

Objective: Account for broader factors affecting productivity.

Key Areas to Discuss and Consider:

- Weather and Climate: Rainfall patterns, temperature extremes, droughts, or floods.
- Water Management: Availability, irrigation efficiency, and water quality.
- Weeds: Species present, competitiveness, infestation severity, distribution, suspected herbicide resistance, management history, and any emerging trends.

Tools/Methods:

- Access local weather/climate data.
- Analyse field-level water distribution systems.
- Identify, map and record weed species' severity and distribution.



For more resources on weed management in sugarcare:

INTEGRATION & DECISIONS

The integration of these information points enables:

- Identification of evidence-based productivity constraints and their causes.
- Development of a targeted management plan.

MANAGEMENT PLAN

Prioritise Constraints: Rank constraints based on their estimated impact on productivity, the severity of the issue, and the feasibility of intervention.

Formulate Recommendations: Develop practical recommendations matched to the identified constraints, including:

- immediate actions for critical issues (e.g. pest outbreaks)
- medium-term adjustments (e.g. variety changes, improve soil health)
- long-term strategies (e.g. climate adaptation measures, training or system improvements).

Work with the Farmer: Ensure the management plan aligns with the farmer's priorities, available resources, and capacity to implement change.

Monitor Outcomes: Review progress over time and adjust recommendations if conditions or results change.

Further technical information, practical tools, and current industry updates on all production topics are available on the SRA website:



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