Sustainability Definitions and Metrics in Kansas Wheat Farming

DAS 582

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Introduction

- Sustainability is often framed with three pillars, economic, environmental, and social, but there is no agreed-upon, Kansas-specific definition for agriculture.
- Kansas wheat regions face contrasting challenges, western regions struggle with groundwater depletion in drought, while central and eastern regions face soil erosion and degradation.
- Understanding how growers define suitability and the challenges they face is critical for defining policies and out programs that can balance economic viability with long-term environmental sustainability

Objectives

This study has three main objectives:

1. Define an operational definition of sustainability for wheat production
2. Identify farming practices that improve overall on-farm sustainability
3. List major challenges that prevent adoption of such practices by Kansas wheat growers.

Methods

- Qualitative online survey delivered via Qualtrics to Kansas Wheat Commission listserv and contacts.
- 16 questions: demographics plus open-ended questions on definitions, measures of economic and environmental sustainability, practices used, and adoption barriers.
- Responses were collected from September to October; 15 responses, 10 sufficiently complete (≥75% answered).
- Extracted concepts to create a matrix of concepts, frequencies graphed in R, using ggplot and readxl.

Figure 1. QR code to R analysis

Results

- Respondents ranged in ages 29–76; farm sizes 50–3,500 acres; mainly Riley and Clay counties with a few from southwest Kansas.
- The most common definition concepts: “profit” and “persistence,” showing a strong focus on economic survival; environmental terms like soil and water quality appear but less frequently.
- The most cited sustainable practices were no-till, crop rotation, cover crops, and soil testing; fewer mentions of more advanced technologies or explicit water-management tools.
- No clear positive correlation between farm size and number of sustainable practices reported.

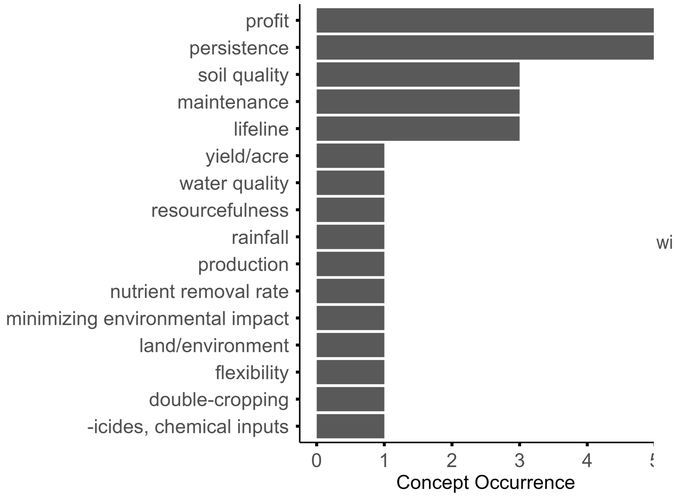

Figure 2. Ranking the concepts in definitions of agricultural sustainability based on number of occurrences of each concept across respondents definitions.

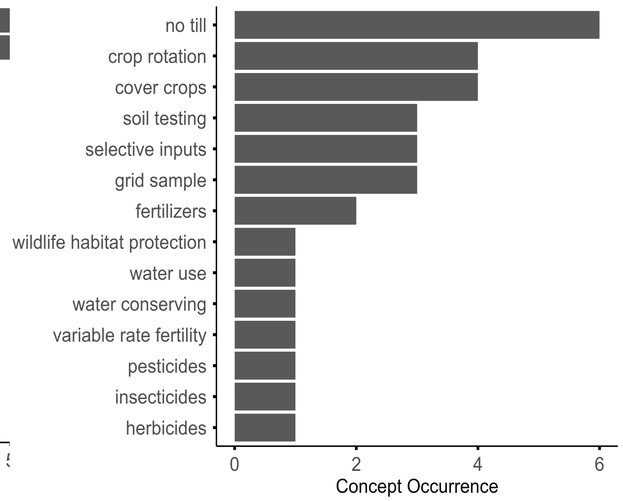

Figure 3. Ranking the management practices used by respondents based on number of occurrences of each practice across responses.

Figure 4. QR code to complete list of survey question and answers

Discussion and Implications

- For surveyed farmers, sustainability primarily means keeping the farm economically viable while using a small set of soil focused conservation practices, rather than a full three-pillar concept.
- Adoption of additional or more advanced practices is constrained by capital, labor, technology access, and perceived economic risk, especially for smaller farms.
- Small sample size and limited regional diversity in the state limit generalizability, but patterns match literature showing structural disadvantages for smaller farms in adopting sustainable technologies.
- Agronomy and extension should build on familiarity with no-till, crop rotation, and cover crops while strengthening guidance on water management, nutrient efficiency, and reduced chemical inputs.
- Policy needs a clearer, regionally aware definition of sustainable agriculture in Kansas and for cost-share and incentive programs that lower up-front costs, particularly for small and mid-size farms.
- Future research should expand the sample size to more Kansas regions, pair surveys with interviews, and link reported practices to economic and environmental performance data.