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Turkey – Drought and Food Security

August 31, 2026

How Drought Impacts Food Security in Sivas, Turkey

Turkey currently faces increasing drought risk and recurring severe drought, making resources more scarce than ever. This is an issue because drought leads to the inability to grow crops and raise animals, which leads to reduced income for farmers – meaning less food production and ultimately worsening food insecurity for people living in Sivas. The Sivas Province is an important agricultural region of Turkey and is home to a large percentage of the country's agriculture and pasture land (Uzun, 2025). Turkey needs to implement solutions to mitigate and adapt to drought, because without help, the threat to agricultural production and food insecurity will continue to grow worse.

Local Impact

Between 1980 and 2020, data measurements were recorded for drought analysis in six different locations of Sivas. The study concluded that the deficiency of rainfall is the main driver of drought in Sivas, and because of that, water resource management and agricultural planning have become extremely important factors in combatting the related issues (Selçuk, 2026). In 2023, the head of the Sivas Chamber of Agriculture said that restrictions on sugar-beet cultivation were put in place in Şarkışla due to the insufficient water supply (Zafer, 2023). These restrictions have a direct impact on local farmers. "Adverse weather shocks may have major consequences on household income and consumption" (Chort et al., 2025). A study conducted by the World

Bank suggests that because of the "weather shocks", such as insufficient water supply, farming households' income and household consumption are negatively impacted. This demonstrates why agricultural practices that increase farmers' resilience to drought are important for protecting both agricultural production and household food security.

Recommended Solution: Drought-Resistant Cover Crops

Cover crops are plants which are planted in specific areas to allow their roots to grow into the soil beneath them, thus creating pathways in the soil to improve water infiltration and soil moisture retention, therefore decreasing chances of soil erosion (USDA, n.d.). While there are already new crop production models being tested in Turkey, they don't mention anything about specifically utilizing cover crops. To combat food insecurity, the country should implement and test a drought-resistant cover crop program into agricultural practices and work with farmers and researchers to proactively fight drought.

The Vision

Researchers would begin by surveying land in Turkey – specifically the Sivas Province due to its agricultural significance – and seek out farms suitable for participating in the cover crop program. Since Sivas is the largest province in Turkey (IFAD, 2013), it would be difficult to efficiently find all the farmland that needs cover crops planted, so researchers should start their efforts in the Şarkışla–Gemerek Plain in the southwestern Sivas Province. This region of the province is specifically known for its agricultural production and is an important producer of sugar beets, wheat, barley, and rye (Ergün et al., 2018). It is also known for its dryland farming practices since local water sources are limited during the summer (Sivas İl Tarım ve Orman Müdürlüğü, n.d.). These two factors make it a perfect starting point for the project and would allow researchers to expand

the cover crop program into more regions of the country later on if the efforts are determined effective. After the land is surveyed, it will be graded on whether it needs to be amended or is already in healthy condition. After grading, crews will begin amending the soil through necessary means – if the soil qualifies to be amended – then start planting cover crops throughout the farmland. (Amendment efforts are complimentary to cover cropping, not a separate solution)

In addition, this project should include supervision over finances, proper budgeting, raising awareness of drought issues, and monitoring of progress during and after implementation to ensure the reliability of this solution. The main goal of this project is to preserve existing farmland to help farmers produce crops and raise animals, maintain a secure source of food and income, and practice sustainable agriculture.

Material and Human Resources Needed for Implementation

This project will require agricultural equipment like row crop planters, tillage attachments (if necessary), and fertilizer attachments (Kientzy et al., 2023), along with the actual seeds for the cover crops. Most importantly, this project will require human hands – farmers, community members, and experts from credible establishments. Key functions include getting the right seeds and monitoring and amending the soil. This project would also create opportunities for community members, such as Colorado State University experts and Colorado farmers, to exchange expertise with the community around Sivas, though the primary focus should remain on Turkish farmers and agricultural experts.

Sustainability and Feasibility

It doesn't go without mentioning that cover crops themselves use up water, meaning this project requires investigation on exactly what type of crop to plant to minimize water usage. This is especially important because of the semi-arid climate in Sivas which doesn't provide sufficient rainfall. Since the crops require water,

they will be terminated at the end of the cash crop period before they can consume too much, leaving sufficient soil water, and be replanted accordingly. Additionally, the terminated crops can be used as a type of fertilizer or mulch that is spread across the top layer of the soil (USDA, n.d.).

This project should use warm-season and cold-season cover crops like Mungbeans and Sorghum Species (warm-season) and Barley and Rye (cold-season) to effectively support the soil in the semi-arid region (Noble Research Institute, n.d, USDA, n.d, University of Wisconsin, 2014). Barley and Rye are especially beneficial for use because they already are grown in Sivas (Sivas Ekspres, 2026), meaning farmers are familiar with these crops and could have greater access to the actual seeds and better understanding on how to properly grow them.

How the Implementation Will Happen

Identifying the problem and creating a solution is only step 1 – implementation is the next. This will happen throughout several phases of the project and will be maintained under specific conditions. Following these phases as intended is an important piece of staying organized and executing the project successfully.

Phase 1

This step in the solution involves communicating with local farmers in Sivas about what a firsthand perspective on drought looks like, informing farmers of the proposed solution, and identifying the extent to which farmers are willing to modify their land. This should be done with the intent of gathering information while building personal and meaningful relationships. Recording data is also a necessary component of this phase and will ensure smooth and professional procedures. Key records include soil-moisture levels at various depths, type of crops already being grown on the farm, and specific geographical limitations on individual farms. Measurements will be used to compare participating plots with similar control/comparison plots under normal farming practices. This will allow researchers to determine if soil needs to be amended through conservation

tilling/reduced tillage, or no-tillage methods. This will vary from location to location. Additional measurements include erosion and soil loss, organic matter, cash crop yield, and farmer costs to further understand environmental and economic sustainability and feasibility (these should be taken periodically throughout the entirety of the project). To record this data, a shared database should be used to help researchers classify, organize, and access it on a regular basis throughout the project.

This phase also includes gathering the required resources, materials, and people for the project. This will involve the Turkish government, specifically the Ministry of Agriculture and Forestry working alongside farmers and private companies like the International Fund for Agricultural Development (IFAD) who are willing to contribute knowledge or funding. Additionally, this phase involves passing measures that fund subsidies, allocating funds to a related program, and even simply spreading awareness of the project. One example that is already being implemented is part of the new 2025 crop production model which describes how the government will cover costs of diesel and fertilizer used (T.C. Tarım ve Orman Bakanlığı, 2024).

Phase 2

During this step in the process, farmland soil in the Şarkışla–Gemerek Plain will be amended (if necessary) and the cover crops will be planted. The cover crop planting schedule will be determined by the conditions of each individual farm, which includes soil-moisture and the type of cash crop being grown. Throughout the growing period, researchers and farmers will monitor soil moisture to determine whether the cover crops are improving water retention without consuming excessive amounts of water. In addition, the cover crops will be terminated before the following cash crop is planted to limit competition for soil moisture. After termination, the plant residue will remain on the soil as a mulch, helping protect the soil from erosion and return nutrients to it (USDA, NRCS, 2024).

Phase 3

After the 1st and 2nd phases, the 3rd will involve the consideration of expansion based upon historical data and measurements. After multiple growing seasons, researchers will conduct results to express either a positive or negative impact on soil-moisture retention, then decide to expand into more regions of Sivas. Additional things must be considered like the cost and efficiency of planting cover crops (opportunity cost), water use, and farmer feedback. Once researchers find conclusions based on the evaluations, they will decide if modifications to the solutions are necessary and if it's feasible to implement this solution in other regions.

Conclusion

Ultimately, this solution is not just to increase the soil water retention in the Şarkışla–Gemerek Plain of Turkey, but to combat drought-related threats to food security through the necessary means – one of those being an agricultural solution: drought-resistant cover crops. This solution provides a reliable, evidence-supported method of reducing soil erosion and increasing soil-moisture levels (Idowu & Grover, n.d.). Improving soil-moisture retention on existing farmland through the use of cover crops can help protect crop production, farmer income, and ultimately help prevent food insecurity. This solution is sustainable for long-term use because it involves controlled research methods, cover crops that are fit to the region's climate, and evaluation of the project's effectiveness. If the program proves successful in the Şarkışla–Gemerek Plain, researchers and farmers could expand it to other drought-prone areas of Sivas and potentially use their findings to inform similar agricultural projects elsewhere in Turkey and around the world.

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