Science Societies

Planning for Variability

By Seth C. Murray, CSSA President, Seth.Murray@ag.tamu.edu

July 17, 2023

We cannot expect specific weather, but we can expect each season's weather to increasingly surpass our expectations in unpre- dictability. Photo courtesy of Adobe Stock/Alexandr.

Optimistic sports fans, gardeners, plant breeders, and other crop scientists inevitably must maintain a belief that “next year” will be better. Throughout the Northern Hemisphere, July is a month for crops and agriculture; when spring planning has been executed and we can only watch and respond. In Texas, by July, we’ve begun corn harvest, and I always have a long list of experiments and field modifications planned for the following year, a few of which may actually happen. Over the fall and winter, these plans change, whether due to new administrative directives, changes in staff and students, or new grants, research findings, opportunities, or scientific questions that pique curiosity.

So it goes year after year. It’s a necessity to be perpetually planning for next year, but the flexibility of planning inevitably ends when next year flips to become “this year.” By spring, our fields must have been prepared; our experiments designed; and our seed packets filled. At some point, the seed was in the ground, and we became limited to only responding to changing conditions no matter what is now thrown at our plans. As a student worker once thoughtfully said, “You can’t unplant your field trials.” We are fully committed to the year. And now in July for most crop scientists, it is a time to watch and respond.

The Forecast: Extreme Variability

Last year, 2022, was the second hottest and driest summer growing season on record in my region of Texas. Correct or not, it was that experience that biased my 2023 breeding selection choices and overall summer plans. We as crop scientists and agriculturalists must use our experience to anticipate the type of year in our planning for “next year.” Despite the optimism about next year referenced earlier, given scant scientific evidence, and short human memory, our default expectation is that next year

will be like the previous year was. What a surprise to find 2023 spring cooler and wetter than normal, at least here. Experienced breeders and agronomists know a variety's stable performance is determined with results over years rather than in a single year (even if our patience is challenged!). We would likely change many things in the field if we knew what this year was going to be like, but, alas, we did not, and so can regret nothing.

Increased extreme variability between years is a weather pattern that climate change experts have told us to expect. It's not just that the average weather will change, getting hotter and drier—a trend we can adapt our plans for; but importantly that the variance will increase with weather becoming more extreme year to year. Al Gore would call this truth "inconvenient," and it seems a likely truth that we have already passed some climate change tipping points (Armstrong McKay et al., 2022). Weather variability is predicted to continue increasing even under the most optimistic climate scenarios. Our actions can still affect how fast and how much this variance increases going forward though, so it remains a moral imperative to reduce anthropogenic climate change.

Arguably, more important for our disciplinary expertise is to help farmers and crops adapt to this changing climate. Doing so is difficult, especially when we don't know how to prepare. While accuracy of three-day advanced weather predictions have dramatically improved to be reliable, 10-day forecasting still has high uncertainty (Bauer et al., 2015). It appears unlikely that we will get to meaningful growing season weather pattern forecasting before planting any time soon, at least beyond broad predictions available from Pacific Decadal Oscillations and El Niños (Goddard & Gershunov, 2020; Kerr, 1994). So, we cannot expect specific weather, but we can expect each season's weather to increasingly surpass our expectations in

unpredictability. As crop scientists, we must attempt to plan for this extreme variability in our future work as best we can as well as be prepared to respond with whatever post‐plant interventions we can muster.

While it is difficult to plan for environmental variability, we nonetheless can steel ourselves to its inevitability. Progress demands it. And it is no different for the Crop Science Society of America.

Collectively Forging a New Direction for Our Societies

This month, the boards of our three Societies (ASA, CSSA, and SSSA) will meet in Madison, WI, along with the board of the Agronomic Science Foundation (ASF) and members of our professional staff, where we will develop our Societies' next strategic plan. This activity includes your elected Executive Board (president‐elect, president, and past president), elected board representatives for each division (CSSA, SSSA) or section (ASA), other elected representatives, and other diverse stakeholders. Over the last year, the board has reflected on our 2020–2023 strategic plan (crops.org/files/Governance/strategic‐plan‐cssa‐2020‐2023.pdf) and the accomplishments derived from it. The last strategic plan did not predict the unprecedented COVID‐19 pandemic or the fallout from this public health emergency. The plan was unable to anticipate CSSA staff changes, stock market fluctuations that impact our financial reserves, or fluctuations to our membership and Annual Meeting patterns associated with COVID‐19.

Nevertheless, the CSSA strategic plan was resilient enough to allow the staff and board to navigate the extreme variability of the last three years. Like long‐term weather forecasts, strategic planning is not (yet) a science. We have incomplete and imperfect knowledge of what lies ahead, so we must use our finite experience and perspectives

to develop and prioritize goals. Yet, like planning for next year's field season, we will have evolving plans and goals. In total, the initial July strategic planning process will consider ~80 diverse perspectives from across ASA, CSSA, and SSSA, whom you voted to represent you. We likewise have come directly to you, as members, to get your perspectives of the challenges you face in your roles and on the priorities you have for your Society. We are relying extensively on your perspectives as we collectively forge a new direction for our Societies.

Strategic planning is critical for science facilitation and our disciplines' advancement. Once we commit to strategic priorities and a vision for what we wish to become, those priorities and that vision should set our direction for the next five years or longer. These priorities will guide our decisions and our responses to changing external conditions. Much like the environment under a changing climate, the goals should incorporate not only the variability we have seen in the past, but also the increased variability we expect to experience in the future.

Strategic Priorities

Integrating what members and staff have shared already, and my memory of the last few years, I am looking for our strategic planning to:

- **Help increase and diversify CSSA membership, finding new ways to deliver value to our stakeholders;**
- **Provide increased leadership opportunities and advocacy for our CSSA early career members;**
- **Diversify our sources of revenue, allowing us to cover our costs while pursuing programs and initiatives that allow us to make a genuine mark on the world;**
- **Improve our publications;**

- **Elevate the prestige of CSSA and CSSA members globally;**
- **And to position CSSA to act more nimbly in response to external opportunities and threats.**

Of course, the devil is in the details for the specific actions future boards take to activate strategic priorities as well as how board members and staff collaborate to implement our vision. While you should feel comfortable that your perspectives have shaped our strategic planning, your engagement with CSSA is what will make our vision become reality! Whatever the outcome of our strategic planning process, it is critical that we anticipate future scenarios and direct energy appropriately since our Society must respond to this change. We can't just unplan a strategic plan. Luckily, few disciplines have more experience planning for variability in the external environment than crop scientists!

References

Armstrong McKay, D.I., Staal, A., Abrams, J.F., Winkelmann, R., Sakschewski, B., Loriani, S., … & Lenton, T.M. (2022). Exceeding 1.5 ° C global warming could trigger multiple climate tipping points. Science, 377(6611), eabn7950. https://doi.org/10.1126/science.abn7950

Bauer, P., Thorpe, A., & Brunet, G. (2015). The quiet revolution of numerical weather prediction. Nature, 525 (no. 7567), 47–55. https://doi.org/10.1038/nature14956

Goddard, L., & Gershunov, A. (2020). Impact of El Niño on weather and climate extremes. In El Niño Southern Oscillation in a changing climate (pp. 361–375). AGU. https://doi.org/10.1002/9781119548164.ch16 Kerr, R.A. (1994). Official forecasts pushed out to a year ahead. Science, 266(5193), 1940–1941.