



Final Report: Summative Evaluation of the Completed Next Generation Crops Grants

Executive Summary

Prepared for

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Executive Summary

The Foundation for Food & Agriculture Research (FFAR) funded a portfolio of research projects under the Next Generation Crops investment portfolio between 2017 and 2024. These projects covered a wide range of topics related to crop improvement and related topics, ranging from upstream seed development to downstream management practices. FFAR contracted RTI International, a nonprofit research organization, to complete a summative evaluation of a subset of Next Generation Crops investments that completed their period of performance by December 2024 (**Table E-1**). The portion of the portfolio that RTI reviewed consisted of 17 grants, representing a total of \$9.9 million of FFAR funding.

The purpose of the evaluation was to evaluate the success of the completed projects within the Next Generation Crops portfolio, capturing projects' outputs, outcomes, and, where available, impacts. To accomplish this, the summative evaluation included two complementary elements: one was a review of aggregate, high-level results achieved by the program, and the second was a deep dive into two "exemplars," or in-depth case studies. These exemplars included a deeper look at specific project achievements of the work accomplished under the portfolio and a quantitative accounting of the economic benefits of the investments.

The subset of Next Generation Crops projects evaluated were successful in advancing research across a range of topics over a fairly short period of time. The organization's investment of \$9.9 million was able to attract significantly more resources from a mix of sources, including \$9.3M in matching, \$5.9M in additional concurrent funding, and \$23.6M in follow-on funding, adding up to total research funding of \$48.6 million. The portfolio covered a variety of topics, focusing on 11 crops and leading to 24 innovations. These innovations significantly advanced with respect to FFAR's Research, Development, and Deployment (RDD) stages, led to six patents being submitted, and one patent reaching the approval stage at the time of this report. In terms of advancing research, projects directly led to more than 150 peer-reviewed publications, including 3,649 collective citations, 26 policy citations, and more than 250 recorded public disseminations.

Table E-1. Overview of evaluated projects within the Next Generation Crops portfolio

Metric	Value
No. of awarded grants	17
FFAR research funding	\$9.9M
Total research funding, all sources	\$48.6M
Avg. length of funding	3 Years, 5 Months, 22 Days
No. of crops	11
No. of innovations	24
Average change in RDD* (Proposal – Project End)	2.7
Average change in RDD* (Proposal – Present)	4.0
Number of publications	153
Number of policy citations	26
Number of citations in the literature	3649
Number of public disseminations	255
Number of approved patents	1

*RDD: Stages of Research, Development, and Deployment

Given the wide range of topics addressed by FFAR under the portfolio, to give focus to the work, RTI focused on three related research questions that would guide the evaluation.

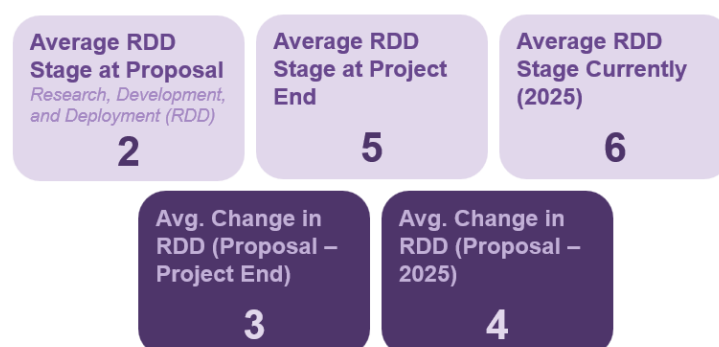
- 1) *To what extent did the portfolio advance research, expand knowledge, and accelerate innovation for target crops? Within which categories were these advancements made?*

There is considerable evidence that FFAR advanced research, expanded knowledge, and accelerated innovations across a range of crops. FFAR supported at least 24 innovations across the 17 projects, including a mix of methodologies, technologies, and practices. Investments were spread across a diverse agricultural portfolio, with efforts explicitly advancing innovations across 11 traditional and non-traditional crops. Projects addressed several distinct technical advancement categories, with nearly all focused on increasing productivity. The next most common were enhancing resilience to pests and pathogens (nine projects) and reducing the use of on-farm inputs (eight projects). Projects also made strong contributions to the peer-reviewed literature, where projects produced more than 150 peer-reviewed publications cited 3,649 times by time of writing. On average, this literature was cited over twice as much than the expected number of citations for similar research, implying that FFAR-funded publications advanced agricultural research more than its peers. FFAR grantees also disseminated their research widely across 188 conferences, but also through courses, workshops, radio, newspapers, and webinars. These numbers were all verified by the evaluation team, but should be viewed as conservative, as the team relied on available data from reports and incomplete responses to surveys.

- 2) *To what extent have Next Generation Crops innovations advanced toward commercialization (increasing the likelihood that they will ultimately be adopted by end users)?*

The evaluation found mixed success in promoting advancement toward commercialization but found compelling evidence for advancement toward technology utilization. The primary metrics used to track projects' progress toward commercialization were RDD stages advancement and

Figure E-1. Average advancement in stages of RDD



patents. In terms of RDD stages, the Next Generation Crops portfolio of projects made impressive gains. They advanced by an average of about three stages from project proposal to project end, and by four stages from project proposal to the present (**Figure E-1**). Regarding patents, six projects applied for patents, but as of the conclusion of this evaluation, only one was approved.

Despite this evidence of advancement, more context is required to fully answer this evaluation question. Commercialization was often not an explicit, stated goal of the projects evaluated, and the innovations that FFAR supported sometimes advanced research broadly and often in the public sphere. However, in many cases, principal investigators (PIs) could

not or did not track next user or end user uptake nor commercialization. Additionally, a more complete analysis of advancement toward commercialization would consider factors such as development resources, inventors/team status, business strategy, and market fit.

- 3) *What is the potential that Next Generation Crops–supported crops, if commercialized, will lead to increased farm profitability? If so, what will be the expected change in profitability?*

The last research question was the most difficult to conclusively assess. Much of the funded research was upstream and/or was geared toward developing methodologies, tools, or other data products that were still a step or two away from being commercialized. Nonetheless, the evaluation team asked the PIs in the survey if data had been collected that would enable them to make an educated estimate for how much yield may increase or input usage may decrease because of the innovation(s) and to share that evidence. Translating those estimates into per acre, current dollar values showed benefits of anywhere from \$49 to \$274 in increased revenue and from \$18 to \$450 in reduced costs per acre across four projects and six crops. These benefits were not independently substantiated and would be realized years into the future but do help to provide a sense of scale in monetary terms.

To complement the research questions above, RTI conducted two deep dive analyses of exemplar projects that reflect persuasive examples of how FFAR supported two technologies expected to have concrete benefits to agri-food system actors. RTI modeled that these two projects could collectively provide approximately \$100 million in benefits to agricultural producers (**Table E-2**). One project, focused on management practices for controlling grapevine ripe rot for East Coast wine grape growers, found the FFAR investment has already led to \$7 million in benefits to vineyards and is projected to provide an additional benefit of \$37 million over the coming decade. The other project, focused on commercialization of a high-protein variety of chickpeas, has a projected impact of \$56 million for agricultural producers, and potentially more for other actors in the agri-food system.

Table E-2. Exemplars' modeled cost-benefit analysis results (US\$ thousands)

Project Title (PI Name)	Type of Benefit Accrued to Farmers (Years Modeled)	Real, Discounted Benefits	Real, Discounted Costs	Net Present Value of Benefits
Using Novel Genes from Wild Germplasm to Boost Protein Content in Cultivated Chickpea (B. Riely)	Prospective (2025–2035)	\$56,710	\$1,157	\$55,552
Developing Novel Strategies for Improved Control and Sustainability of Grapevine Bunch Rot Management (M. Hu)	Realized (2020–2024)	\$7,492	\$407	\$7,085
	Prospective (2025–2035)	\$37,598	\$407	\$37,191

These exemplars were standout successes and not reflective of the wider set of funded projects. The wide diversity in both crops and types of innovation supported by the broader

portfolio implies a tradeoff between a wider set of research outcomes versus a narrower set of breakthroughs in specific crops or technologies. Also, the upstream and research foci of the investments tended to mean that projects were more geared to producing innovations that served as public goods rather than being optimized for commercialization as an end goal.

Through desktop reviews, research, and surveys, this evaluation was able to collect, standardize, and summarize a substantial amount of data and information about the achievements of a subset of Next Generation Crops projects. The portfolio performed extremely well, effectively advancing research across a diversified number of crops, generating a wealth of research outputs, and supporting different promising types of innovations that have the potential to increase benefits to farmers. However, several factors limited a full accounting of the outcomes; some projects ended years ago, so several PIs had moved on to different organizations and/or had unknown updated contact information, and final reporting lacked the ability to draw out key and nuanced details. Given these challenges, it is likely that the Next Generation Crops program had greater impacts than are reflected in this evaluation.