

**The Value of Plant Pathology Research to US Agriculture:  
The Case of Sweetpotato Seed Quality**

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- Sweetpotato growers face rising challenges from labor costs and virus pressure, which threaten profitability.
- Yield trials across five states show that older seeds reduce the harvest of marketable sweetpotatoes, leading to economic losses of \$1,000–\$2,500 per acre.
- Clean seed from National Clean Plant Centers offers a solution that can maintain or boost yields without expanding planted area, highlighting the role of plant pathology research in the economic success of agriculture in an increasingly complex environment.

***Background***

The National Clean Plant Network (NCPN) is a key asset to U.S. agribusiness, working to reduce virus transmission by providing “clean” (virus-free) seed to farmers and seed growers to support high-quality yields across several sectors (NCPN). For example, farmers in the U.S. southeast and California are increasingly cultivating sweetpotatoes to meet rising consumer demand (USDA NASS). However, while production is increasing, farmers face profitability challenges due to higher labor costs and escalating pest and virus pressure (George et al.; Castillo et al.).

***The National Clean Plant Network***

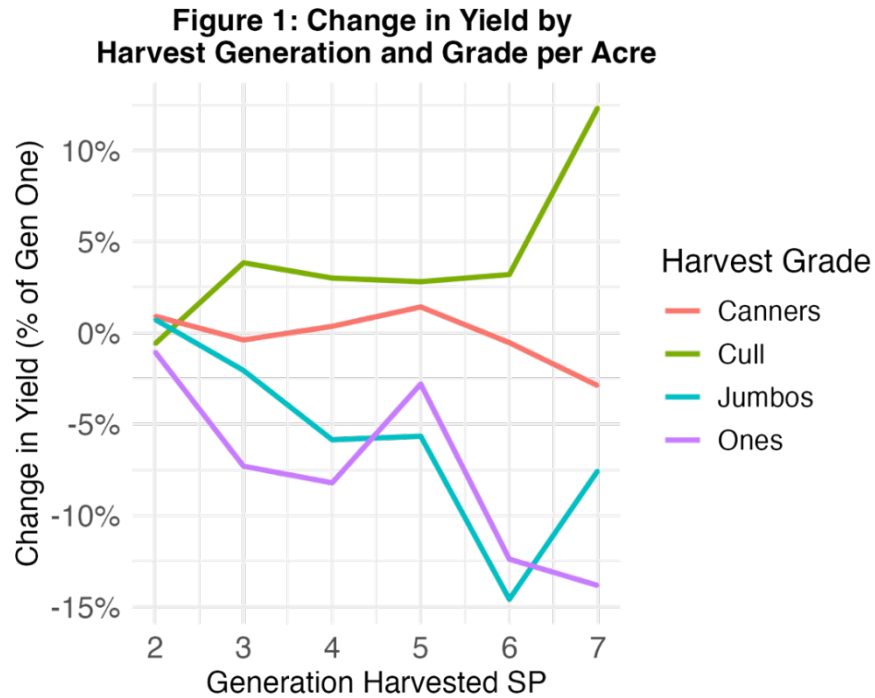
Since the beginning of the National Clean Plant Network program in 2009, USDA has provided funding to 23 clean plant centers plus supporting programs in 20 states, focusing on berries, citrus, fruit trees, grapes, hops, roses, and sweetpotatoes. These crops all use propagation for replanting. In the case of sweetpotatoes, a harvested root is used as the next season’s seed. As these seeds grow, they produce vines that are cut into sections and planted in the spring. The NCPN centers maintain a virus-free seed stock that produces “clean” seeds for the sweetpotato industry.

***Why Does Clean Seed Matter?***

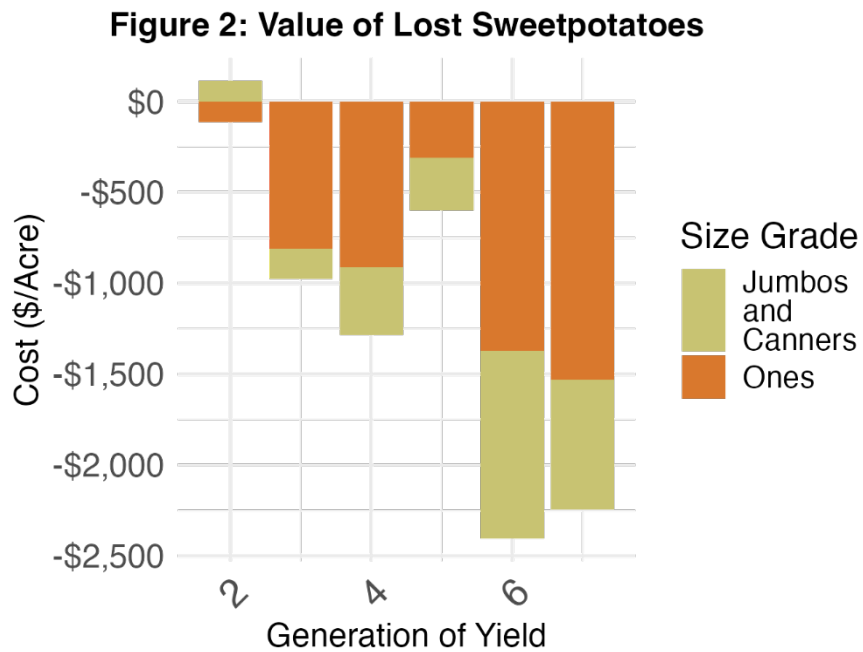
Each winter, sweetpotato growers must decide whether to sell their entire harvest and purchase new seed or save a portion of the harvest to use as seed. There are trade-offs involved: while new seed is costly, reusing seed results in lower yields and quality. The more generations that pass before seed replacement, the greater the exposure of the seeds to pests and viruses (Clark et al.). This study aims to more precisely estimate the yield impact of seed decisions than prior research and better understand the implications for the value of plant pathology research.

Yield trials were conducted over three years in Arkansas, California, Louisiana, Mississippi, and North Carolina. Each state planted randomized plots using sweetpotato seed of varying age (i.e., the number of seasons a seed has been reused, plus one). The first harvest from a grower using clean seed is Generation 2. Only seed growers will harvest Generation 1 sweetpotato roots.

When analyzing the trial data collectively, Figure 1 shows that the older seeds result in lower yields of high-value grades (Ones and Jumbos), no change in the yield of small sweetpotatoes (Canners), and an increase in non-marketable sweetpotato roots (Culls).



A decline in yield reduces farm revenue and puts profitability at risk. To assess this impact, we attached economic values to yield losses. As shown in Figure 2, aging seeds are associated with losses from \$1,000-2,500/acre.



### ***Economy Wide Impacts***

Shifting seed decisions across all seven NCPN focus crops has broader regional impacts on agricultural incomes and rural economies. The NCPN's work to reduce seed retention decreases the virus load in these crops, increasing yields for all producers. This creates a positive feedback loop of improved productivity.

### ***Takeaway***

Improving seed replacement practices can boost total production without requiring additional land. Enhancing productivity per acre is critical given the competing demands for agricultural land, particularly near growing peri-urban areas. Investing in clean seed through NCPN centers can support grower viability and sustainable land use. Additional work to identify the economic returns to NCPN's sweetpotato breeding is in progress.

### ***Acknowledgments***

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