**What is your top priority in food and agricultural research, extension, or education that NIFA should address?**

Natural, production and urban forests worldwide are increasingly threatened by global change resulting from human-mediated factors, including invasions by deadly exotic pathogens and insect pests. These disturbances have the potential to cause massive and irreversible damage by eliminating centrally important tree species in many areas of the world, and permanently altering food webs and biomass productivity of forest communities. In addition to imposing conspicuous economic losses, such wide ranging ecological impacts can compromise the maintenance of ecosystem services upon which humans rely, such as carbon sequestration and flood control, all the way to those associated with reduced incidence of cardiovascular diseases in urban human populations.

That is why we strongly believe that one of the top priorities that NIFA should address is forest health. It appears that funding allocated to forest health projects has been steadily decreasing and has been frequently discontinuous in recent years, making much fundamentally important research work virtually impossible, especially in the longer term needed to work with trees. Traditionally, NIFA has lumped forest health research in with all other plant health research, but, in our view, this has seriously hampered such research because forest health research cannot compete with research on model or crop plants, which can provide much faster returns on investment. In other words, what has been lacking from NIFA is a long-term strategy for dealing with fundamental issues in forest health. Without such long-term perspective we will keep spinning our wheels and never be able to make much of a difference when it comes to protecting our precious forest resources.

Our top priority, therefore, is to ask that research on forest health be treated as the special category it is. In our view, there should be a special “division” within the NIFA funding structure devoted solely to all aspects of forest health. Such “division” should also fund extension and education efforts, as preserving the health of our forest is a task that starts with the everyday activities of all people. But for this to be possible, we have to ensure that the importance of forests and forest health is properly understood and appreciated at a large, long term scale, and that the correct information regarding approaches that are either harmful or helpful is widely disseminated.

**What are the most promising science opportunities for advancement of food and agricultural sciences?**

In the face of the threat of decimation by exotic tree pathogens and insect pests, a glimmer of hope for important tree species and their associated biodiversity lies in our ability to exploit the low proportion of genetic resistance exhibited in the natural populations of target, formerly unexposed (naïve) forests. Indeed, genetic resistance is of fundamental importance to plant health in general, a fact that has not been lost on crop breeders all over the world for at least a century. Unfortunately, a similar approach has been largely lacking for forest trees, in large part due to the difficulty and long time spans necessary to achieve practical results. However, modern advancements in biotechnology are making possible research approaches that were unthinkable just a couple of decades ago. We argue that developing and deploying host resistance, which can also improve efficacy of biological and other control strategies, provides a foundation for responses to invasions of naïve forests. Modern tree improvement programs are increasingly capable of restoring tree defenses and providing trees for planting that are capable of withstanding these pests and pathogens. Furthermore, early implementation and sustained support of these programs is important for their success, and this is only possible with funding from agencies like NIFA, provided they take the long view.

Taking all this into consideration, we suggest that supporting research on tree resistance discovery, development, and deployment is the singularly most important approach NIFA could take to dealing with invasions of world forests by exotic pathogens and insect pests, including for existing problems such as sudden oak death, emerald ash borer, white pine blister rust, laurel wilt, ash dieback and many other recalcitrant systems.

Knowledge gaps that should be addressed by NIFA include challenges associated with the integration of improved germplasm into naturally regenerating forest ecosystems that are managed by diverse stakeholders. Thus, resistance development programs should be carefully linked to restoration research and planning to ensure that improved germplasm is matched ecologically and silviculturally to management objectives.

Experience has shown that relying on short-term emergency funding for research and development reduces the prospects for effective, long-term, ecosystem protection from invasive forest pathogens and insect pests. The few historical examples of successful operational deployment of trees resistant to such invasive pests have benefitted from long-term support necessary for program continuity. To improve the prospects of integrating host resistance into responses against future invasive pests and pathogens, we propose that permanent physical infrastructure be established and continuously maintained in different regions within the country. We envision that physical infrastructure, including field sites and biosafety level facilities, would be permanently funded to conduct screening and progeny trials, and would be staffed through adequate base funding with new cadres of forest tree geneticists and breeders collaborating closely with staff and university pathologists and entomologists. Early and sustained support of host resistance programs through feasibility assessment, trait discovery, development, and sustainable deployment will require greater public and governmental commitment and continuity than is available today.

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