Integrated seed health approach and the seedHealth model

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Purpose of the seedHealth model

The integrated seed health (ISH) approach emphasizes using an effective combination of
- Quality seed purchases
- Disease-resistant varieties
- On-farm management

The seedHealth model is a tool for evaluating how these management components work together in particular systems

For example, how many cycles can farmers save their own seed if they use resistant varieties?

Level and uses of the seedHealth model

Level. Farm, village, country, or region

Users. Extension agents, grower groups, seed intervention designers and implementers, seed businesses

Output and audience of the seedHealth model

Output. Likely outcomes, based on current data, of seed health management combinations. Can evaluate required system improvements for improved seed health, answering 'what if' questions about management.

Audience. Seed intervention designers, implementers, evaluators, practitioners, researchers, donors and policy makers

Minimum sample size for the seedHealth model

The seedHealth model can be used to consider hypothetical scenarios, without any data collection

When precise estimates are needed for a particular system, enough data to characterize the system is needed

Resources for using the seedHealth model

If data are already in hand, or for a hypothetical scenario

Number of people: 1+ people to organize the data and define the scenarios of interest

Equipment: Internet access to use the online model framework; a computer with R software to use more detailed models (R is free)

Expertise: 1+ team member needs experience evaluating biological/agricultural models

Timing for the seedHealth model

The seedHealth model can be used at any point in a seed system project, when there are data or concepts available

J. H. Hernandez Nopsa

Duration, seedHealth model

In a one-day exercise, an individual can provide a scenario, or a team can provide a group perspective, and evaluate outcomes

Estimating parameters for the model from a complicated data set may take a researcher a few weeks

If new variations on the existing code are needed, this may take an experienced R programmer a few weeks

Steps for using the seedHealth model

Step 1. Decide on the questions to be asked using the model (as an individual or as a group)

Step 2. Estimate model parameters from existing data (or define a hypothetical scenario)

Optional step 3. Collect new data related to seed health in the field (potentially requiring many months), or new data related to farmers' management choices

Steps (continued)

Step 4. Enter the estimates (or scenario information) in the simpler seedHealth model online - or do more detailed analyses in R

Step 5. Evaluate the output of the model in light of the questions, and consider potential follow-up analyses

Step 6. Summarize the results for stakeholders and prepare a report and/or a journal article

Methods that can be combined with the seedHealth model

Literature review. Parameter estimates may come from published literature

Biological studies in the field. New data may be collected to characterize crops, pathogens, and field conditions

Social studies in the field. New data may be collected to characterize farmer decision making about management choices

Gender

Questions used with the seedHealth model can incorporate gender – for example:

If gender influences access to management (e.g., resistant varieties, options for seed selection, purchase of clean seed), what are the implications for yield over time?

Limitations of
the seedHealth model

Ultimately users of the seedHealth model may want to provide recommendations about frequency of seed purchase and other management choices.

But it may be challenging to collect enough data about infection rates and disease-yield responses to give <u>precise</u> recommendations, and additional time would be needed to test recommendations in the field.

Main advantages of
the seedHealth model

Improves understanding of how seed management options are likely to combine to affect disease and yield

Recent cases:

Introduction of the model and illustration of general scenarios for seed health management. *Phytopathology.* HERE

Analysis of the effects of seed production methods for sweetpotato in Tanzania. *Plant Pathology*. HERE

Thank you

Contact person

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User guide: Garrett, K.A., and Xing, Y. 2021. User guide to the seedHealth model as part of the integrated seed health approach. Lima (Peru). CGIAR Research Program on Roots, Tubers and Bananas (RTB). RTB User Guide. No. 2021-5. https://doi.org/10.4160/9789290605782

Description sheet: Garrett, K.A., and Xing, Y. 2021. Description sheet for the seedHealth model, part of the integrated seed health approach. Lima (Peru). CGIAR Research Program on Roots, Tubers and Bananas (RTB). https://doi.org/10.4160/9789290605867