Are Seed Banks Viable Option for Drought Risk Management in South Asia?

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BACKGROUND

- Cereal systems in South Asia cover more than 132 million hectares of agricultural lands which significantly contribute to the livelihoods and food security of millions of people.
- Recent studies have shown that South Asia could lose 10-50% of cereal production by the end of the century due to global warming, despite the beneficial aspects of increased CO_2.
- The frequency and severity of droughts in the region have drastically increased in the last five decades that led inadequate water supplies for crop production in many areas.
- These evidences indicate that cereal systems in the region are vulnerable to damage from extreme climatic events, increased water stress and inadequate water supplies for crop production.
- While several management and technological interventions are being promoted for adaptation to droughts, maintenance of seedbanks where extreme climatic events frequently occur could help farmers to establish the crops quickly in the same season or in the next season in case crops are destroyed.

RESEARCH QUESTIONS

- Where agricultural areas would have the requirement of seedbanks in South Asia?
- What would be the return period for use of seeds from seedbanks?
- Which crop's seed and varieties should be stored in a given location?
- Will maintenance of seedbanks be economically viable?

METHODOLOGY

- Valid study grids in South Asia were generated by overlaying country boundaries, land uses, unirrigated/ partially irrigated areas and valid sowing periods. All further analysis of the datasets was carried out only for these valid grids (Fig 1).

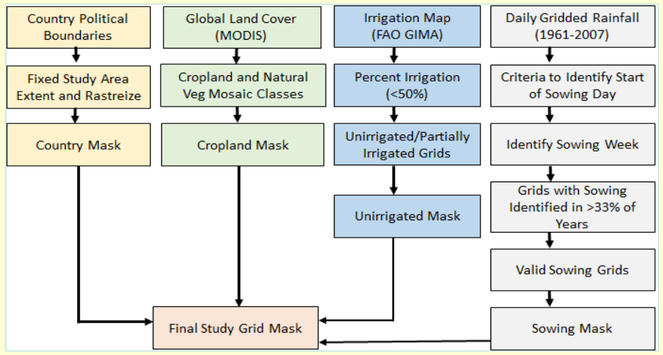

Fig 1: Identification of valid study grids using spatial datasets

- Four scenarios were postulated for computation of normal rainfall/meteorological drought at different stages of crop season (Fig 2).

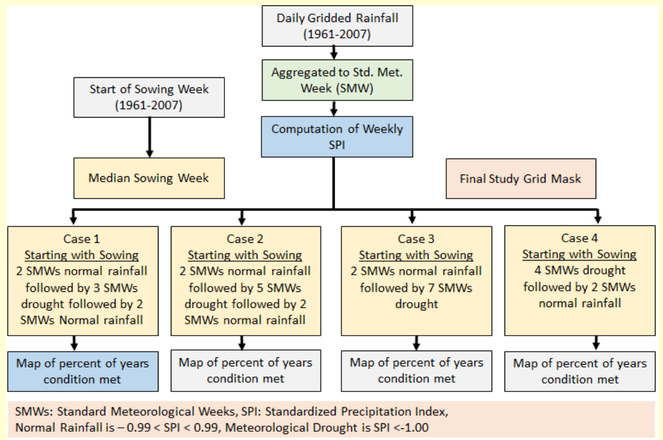

Fig 2: Steps for identification of seed bank requirement

- Potential of alternative crops or short duration varieties of main crops under each scenario was assessed based on timing and duration of drought in the cropping season
- Cost of seedbank management in each identified grids was estimated based on seed and management costs.

RESULTS

- Fig 3 presents number of grids which may require seeds for replanting due to crop failure under different scenarios. Very few grids have severe drought stresses that would require replanting.

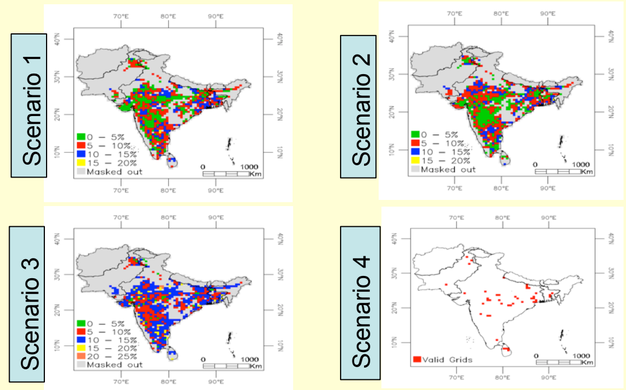

Fig 3: Locations for seed bank requirements

- Farmers may choose short duration varieties of main crops or alternative crops (legumes and millets) depending on timing and length of drought during the cropping season
- Maintenance of certified/foundation seeds in seedbanks requires $60.29M for main crops and $48.34M alternative crops for replanting only in 1.8 M ha crop lands in India along.

CONCLUSIONS

- Despite large area under the rainfed agriculture system in the region, only a small fraction of areas requires seeds once in 5-7 years and remaining areas require seeds once in 15 years or more.
- Type and amount of seeds required to maintain in the seedbanks are determined by timing and length of drought during the cropping season
- Maintenance of seeds in the seedbanks even for small area where seeds are needed every 5-7 years would be a huge financial burden and not worthwhile.