

## ***A Life-cycle Approach to Low-invasion Potential Bioenergy Production***

[Bioenergy is being pursued globally](#) to decrease greenhouse gas emissions and provide a reliable energy source.

- Invasive species are among the top five threats to global biodiversity.
- Once established, invasive plant eradication is difficult and expensive except in very small areas.
- Predicting where and which species will become invasive is difficult.
- Invasion mitigation cannot be limited simply to choosing the right species and planting it.

Invasion risk mitigation—[Cultivar selection](#)

- A weed risk assessment is a recent and fast-developing tool for assessing the invasion risk associated with a plant.
- Environmental niche models seek to forecast where a nonnative species will ultimately spread from points of introduction.
- Mechanistic modeling can be conducted in a laboratory, but field experiments will be required to yield cogent estimates of invasion likelihood.

Invasion risk mitigation—[Production](#)

- Preintroduction germplasm selection and screening is unlikely to succeed by itself.
- No single prescription exists for decreasing invasion risk associated with bioenergy crop production.



Invasion risk mitigation—[Closure](#)

- Lack of planning for bioenergy plantations may result in biological invasions that then become a public responsibility.
- New owners of property should be made aware of the possibility that the former bioenergy crop will continue to reemerge for some time.
- Extirpation (complete removal) can be an intensive, time-consuming process.

Invasion risk mitigation—[Policy tools](#)

- Government grant and incentive programs can encourage use of mandatory risk mitigation practices throughout the product life cycle without requiring all growers to comply.
- The Renewable Fuel Standard also now incorporates management measures to mitigate escape risks.
- Risk management plans must identify and incorporate management measures throughout the bioenergy life cycle.
- Consideration of existing bioenergy policies and programs in the United States suggests a partial adoption of a life-cycle approach.

[Exit strategy](#)

- Several regulatory strategies can encourage producers to internalize costs at the plantation and project levels and decrease risk to the public.
- Several U.S. states that require permits for cultivation of commercial-scale bioenergy crops currently require financial assurance as part of their permitting processes.
- Financial assurance is a useful, but limited, disincentive to abandonment of bioenergy plantations.
- The centralized structure of bioenergy production offers a solution that may resolve issues of liability.

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