

Development of Quantitative Criteria and Rating Scales

Criteria for evaluating pathogen threats under bioterrorism scenarios, as internal or external introductions (**Terms in orange require quantitative scale**). Note—need a real zero; use a 1-5 with 3 being the “average”

1) Pathogen establishment in the U.S. is possible:

- a) Infection units (spores, mycelium, sclerotia, etc.) remain **viable** for a **long period of time** under natural conditions. 1= less than one day, 2= less than 7 days, 3= less than 30 days, 4 = crop cycle or year, 5 = persists
 - this can be used for all taxa
- b) There is a natural (wind, vectors, water, etc.) or mechanical (equipment, such as harvesters, sprayers, misters, airplanes crop dusters, etc.) means of **dissemination** within and among growing areas.
- c) The pathogen has a **high infection efficiency**.
 - **Infection and establishment occurs** under a wide range of conditions.
- d) The pathogen has **high reproductive potential** in the field
 - infection unit/time ; depends on taxa. Ro concept might apply.
- e) The pathogen has **numerous alternative hosts**
 - **increased risk with asymptomatic hosts**.
- f) U.S. **germplasm** is particularly **susceptible** to the pathogen (1=low percentage of available germplasm to 5=100% susceptible).
- g) The pathogen's U.S. **germplasm** is **densely and widely distributed**. (1=isolated to 5=large acreage of monoculture)
- h) No effective or economical **control(s)** of the pathogen is **available**.
- i) Pathogen can survive intercrop periods over a wide range of conditions

2) The risk of a particular pathogen can be evaluated by assessment of these characteristic:

- a) The pathogen or its inoculum, or vector is 1=**difficult** to 5= **easy** to **obtain**.
- b) The pathogen or its inoculum , or vector is 1= difficult to 5= **easy** to **grow**.
- c) The pathogen or its inoculum , or vector is 1=**difficult** to 5= **easy** to **handle**.
- d) The pathogen or its inoculum, or vector is 1=**difficult** to 5= **easy** to **transport**.
- e) The pathogen or its inoculum, or vector is 1=**difficult** to 5= **easy** to **deliver**.

3) A pathway for entry exists

- a) The infested/infected material (IIM) **arrives** at U.S. borders /ports **with frequency**.
- b) The IIM can be **co-mingled** with non-contaminated commodity (-ies), during storage, transport, and /or processing.
- c) The IIM **arrives** at U.S. borders **in volume**, making (sampling/testing/detection) inspection difficult.
- d) The IIM is **distributed** to **several** locations.
- e) **No** method for rapid, reliable, and sensitive **detection** is available on entry.
- f) The pathogen can be **disseminated** by inanimate objects.

4) The pathogen has significant social or psychological shock value

- a) Pathogen presence can **create uncertainty** or affect markets, whether plants or animals.

- b) The pathogen produces a **toxin** or byproduct, actual or perceived, that **contaminates** or accumulates in **food/feed**.
 - c) The pathogen can be **genetically altered** to threaten food/feed security.
 - d) The pathogen can **affect natural resources, native plants** or ornamentals, and/or urban landscapes.
- 5) **Pathogen establishment in the U.S. would have direct economic effects on U.S. farmers, ranchers, or other agricultural producers: [see group 1]**
- a) The **commodity** (-ies) affected **has a high value of production**.
 - b) Pathogen presence would adversely **affect the market** (raw, processed food/feed, animals).
 - c) Pathogen establishment in the U.S. would **affect the economic well-being** of U.S. producers and/or consumers.
- 6) **Pathogen establishment in the U.S. or regionally within, would have trade-related economic effects on U.S. farmers, ranchers, or other agricultural producers:**
- a) Pathogen presence would **raise unit costs of production [use percentage change in cost]** (via yield losses and/or input cost increases) to lessen U.S. comparative advantage in the market.
 - b) The presence of the pathogen in the U.S. would **close off export markets** due to other countries' phytosanitary regulations.
- 7) **Public costs of monitoring for, eradicating, or managing the pathogen in the U.S.: Scale of cost is may be direct or inverse to:**
- a) The **probability of early detection** is low
 - **rapid eradication** of an introduced pathogen is **low**.
 - b) The **time frame** for effective eradication is **long**.
1 = days, 2= weeks, 3 = one crop cycle, 4=more than one crop cycle or years
5=unlikely to eradicate
 - c) The **costs** of the pathogen's **eradication** would be **high**.
 - Agronomic versus landscape (leave to economists)
 - d) The **costs of monitoring/detecting** the pathogen within U.S. borders would be **high**. (leave to economists)
 - e) The **costs of managing** the pathogen population would be **high**. (leave to economists) Dollars/production unit /year
 - f) There is **insufficient knowledge** for producers to cost-effectively or successfully **manage** the pathogen.
 - g) Producers and other affected parties do not have the **equipment** and/or **expertise** to deploy **controls** (e.g. chemical, biological, cultural practices).

Threat of quarantine tends to drive disease detection underground