

Weeds in your hedgerows? Guidelines for management actions

Report on field research and
analysis conducted by:

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Background

Goal: Determine characteristics of hedgerow, surrounding landscape, and weeds themselves that might help in minimizing plant invasion in hedgerows

Reasons: Hedgerows are meant to be conservation features, for attracting pollinators, filtering field runoff, providing habitat for game birds, simply being aesthetically pleasing, and more. Plant invasion in hedgerows could compromise some of those goals as well as run the risk of providing safe harbors for weeds to invade adjacent crops.

Approach: Surveyed 35 hedgerows in agricultural lands in Yolo, Colusa, and Solano Counties and set up a supplementary shade experiment. Surveys took place in spring of 2009 and 2010. For the shade experiment in 2012, I used three types of shade cloths in bush-free areas within established hedgerows. The cloths blocked different percentages of light, mimicking light conditions under hedgerow edges and middle. This was balanced against full sun "control" sites where no shade cloths were put in.



Diversity of hedgerows



Data collected:

- (1) Spatially-explicit number of species (diversity) and percent cover (abundance) of all plants, native and non-native, in hedgerows
- (2) Details about each hedgerow and surroundings, including length, width, orientation, management regime, age, type of adjacent crop.
- (3) For shade experiment, the different species numbers and percent cover under each of the shade cloths



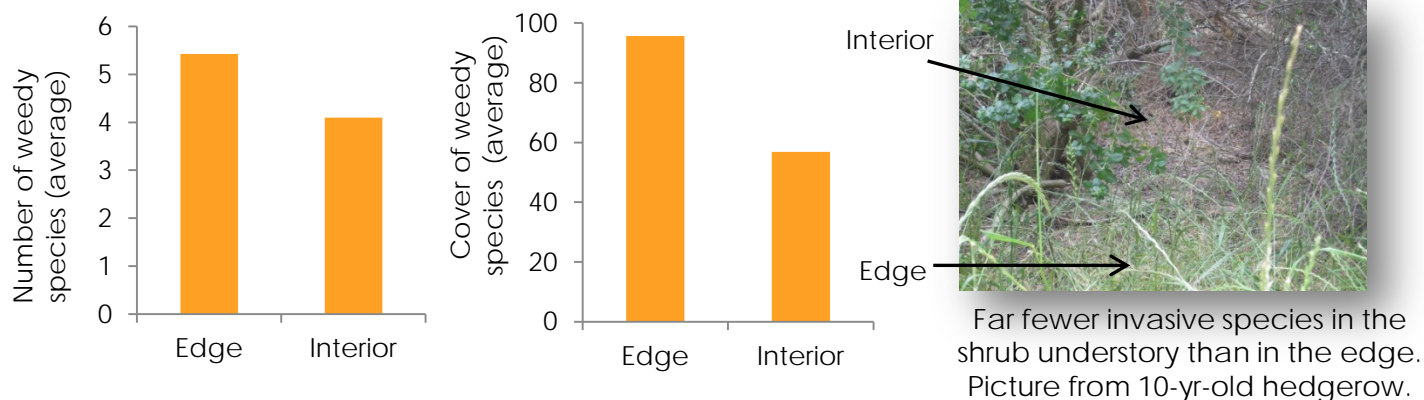
Example of 1m² quadrat (PVC tubing square) used for sampling

Levels of experimental shade cloths



Results

- Hedgerow edges are distinct from interiors with far less species diversity and abundance in interiors. That pattern is largely due to the intense shading provided by well-established, large planted shrubs



- Weed community patterns were most strongly associated with environmental, historical, structural, and/or landscape explanatory variables.

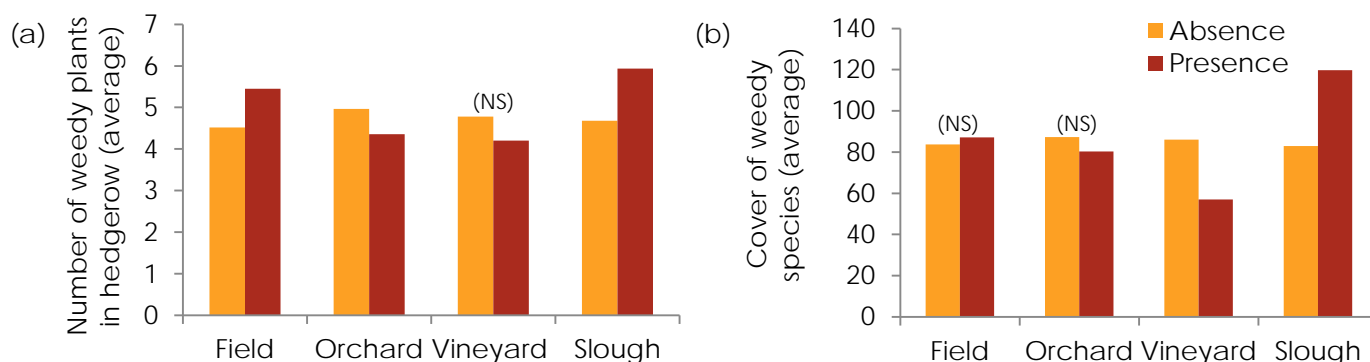
Key explanatory variables

Environmental: soil type

Historical: age, type of hedgerow site preparation

Structural: orientation, width (narrow vs. wide)

Landscape: type of adjacent field crop (see Figure) and number of other hedgerows up to 200 m away



Total invasive (a) richness/diversity and (b) cover/abundance differed significantly based on whether or not they were adjacent to fields, orchards, vineyards, or sloughs.

Effects of other surrounding landscape types (ditch, edge, and row crop) are not shown here as they did not strongly correlate with either richness or cover.

*NS stands for non-significant difference. All other bars (unmarked) show significant differences

- Shade has a strong negative effect on weedy plant diversity and cover.

The number of species underneath the shade cloth that blocked 90% of light was four times as low as the diversity under the 60%, 30%, or control (no cloth) plots.

Cover dropped by six times underneath 90% cloths.



Underneath 90% shade cloth

Management recommendations

- Choosing hedgerow sites:
 - Certain soils could be harmful (e.g., entisol or inceptisol soils) or facilitative (i.e. alfisol or vertisol) for weed establishment
 - Hedgerows oriented along the north-south axis had greater weed diversity than ones running along the east-west axis. These patterns may be due to prevalent wind directions in this area; hedgerows might be acting as “drift-fences.”
 - Managers should also consider what type of landscape immediately surrounds their hedgerow site.
 - Sloughs, fields, and edge matrices were positively associated with greater invasion whereas vineyards and orchards were negatively associated with invasion.
 - The types of surrounding landscape associated with greater invasion all have low structural profiles and may be less heavily managed than vineyards and orchards.
 - Sloughs and fields may provide greater habitat for birds and animals (“edges” types were usually heavily-used field edges, often compacted).

Examples of types of surrounding landscape



Row crop and edge



Orchard and row crop



Field and vineyard



Row crop and ditch

- Management: The very methods meant to diminish plant invasion could be associated directly or indirectly with increased habitat suitability for invasion.
 - Tilling had a significant positive correlation with invasive cover and prepping that involved disking or surface scraping was also associated with greater invasive cover. Those methods may uncover dormant seed banks or create habitats that are easily invaded.
 - Though much more labor-intensive and sometimes more costly, well-timed solarization might be a good alternative.

Management recommendations

- Longer-term: Hedgerow owners may be able to relax long-term concerns about plant invasion because *increased age was strongly associated with a decline in invasive cover*. There will still likely be weeds along the edges of the hedgerow. However, those might be easier to manage with period mowing and targeted herbicidal spray.
- Other concerns: Weed diversity and cover dropped off sharply when moving away from a hedgerow into the surrounding agricultural landscape. Though managers should and will always be vigilant about weed invasion into their crops, *hedgerows do not seem to be acting as a source of invasion*. Many other studies throughout the US have also found that the risk of field margins contaminating field crops is relatively minimal after a distance of 10 ft or so.



Wheat field near planted hedgerow
with orchard in background

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Please send any questions to mlwilkerson@ucdavis.edu and visit www.maritwilkerson.com to learn about my other hedgerow research