

Critical Period for Weed Control or Critical Weed-free Period

(Knezevic et al., 2002; Swanton et al. 2015)

Duration of Competition

Critical period for weed control: The period during a crop when weeds must be controlled to prevent unacceptable yield loss.

Utility: Helpful in deciding whether and when weed management is needed during a crop.

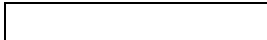
How is it determined?

The study includes two sets of treatments:

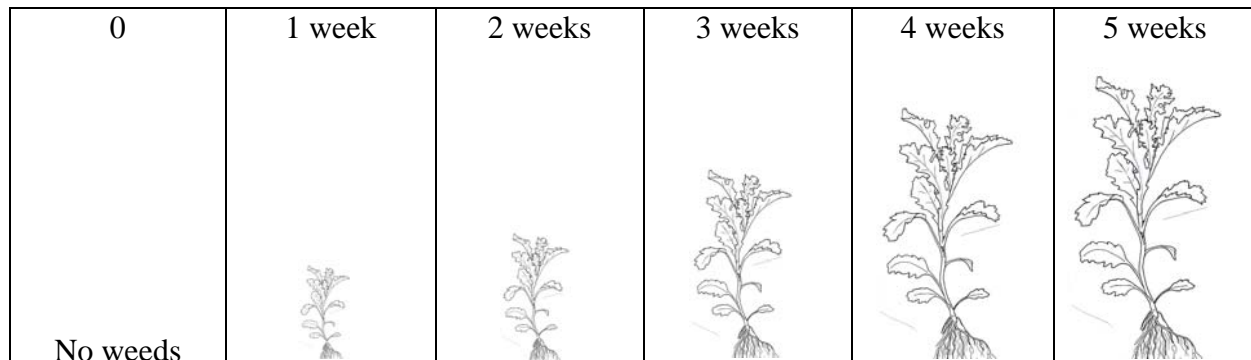
Weed removal treatments (weedy curve)

- Weeds are allowed to grow for increasing durations after crop establishment followed by a weed-free period until the crop is harvested.
- This allows determination of the maximum duration of competition that can occur between early season weeds and the crop before an unacceptable yield loss occurs.

Weeds are planted in all treatments at the same time as the crop and removed at increasing intervals after planting of the crop and are maintained weed free until crop harvest.

Period with weed control ---- 

Period without weed control -- 

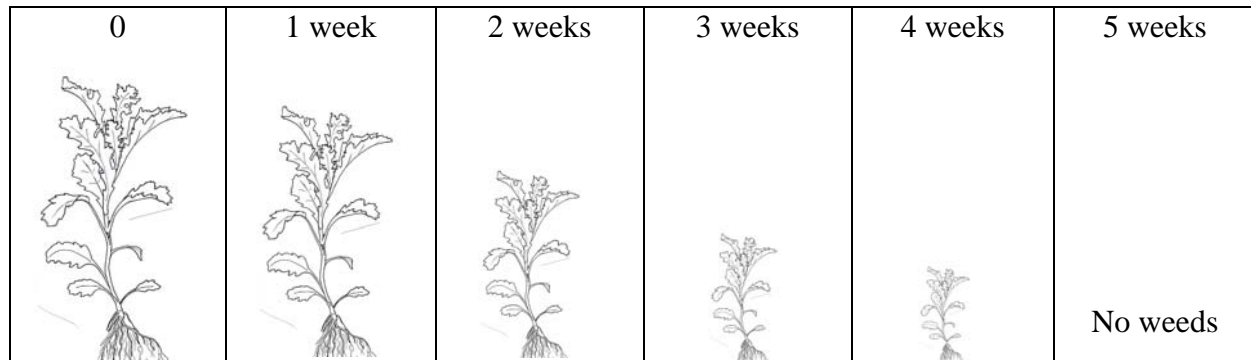
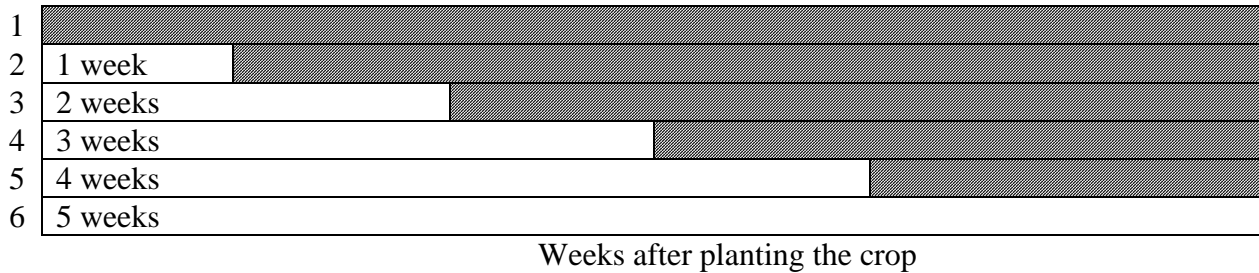


How is the crop affected?

Weed plant-back treatments (weed free curve)

- The crop is kept weed-free for increasing durations after establishment. After each duration weeds are allowed to grow until the crop is harvested.
- This allows the determination of the minimum weed free period from the planting of the crop to avoid an unacceptable yield loss.
- Beyond this stage of crop development no further weed management measures are needed to ensure maximum yield.

Weeds are planted with the crop and at various intervals after the planting date of the crop



Weed intervals can be weeks after planting the crop, growing degree days, or at crop growth stages.

Acceptable yield loss threshold is often established at 5%.

Advantage: Easy study to conduct under field conditions with the crop at a constant density.

Disadvantage: Usually utilizes a single species so that results cannot be readily extrapolated to crop affected by more than one species.

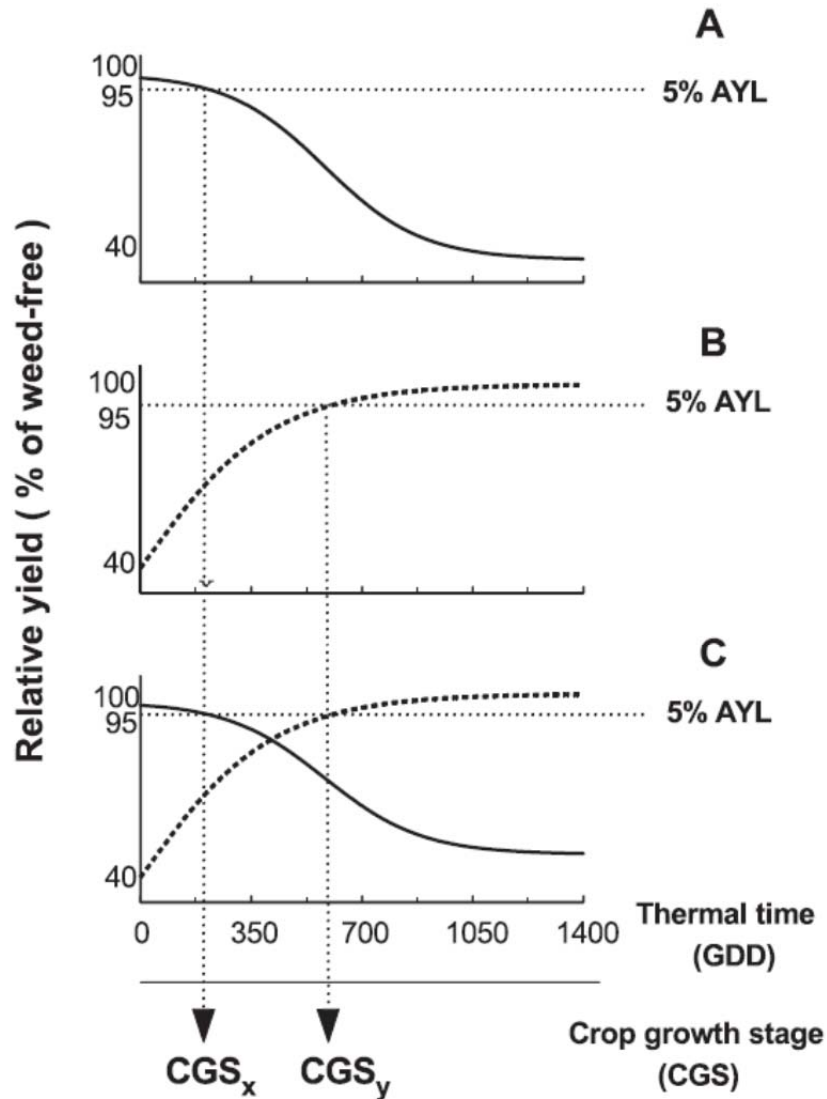
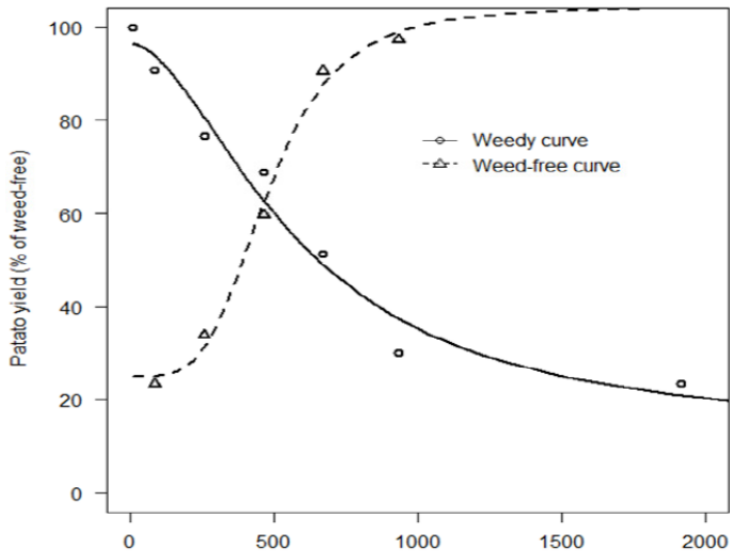


Figure 1. Functional approach used for determination of the critical period for weed control (CPWC). (A) The critical time for weed removal (CTWR) is determined from the so-called weedy curve (—; descending line), fit to data representing an increasing duration of weed interference. (B) The critical weed-free period (CWFP) is determined from the weed-free curve (---; ascending line), fit to data representing the increasing duration of the weed-free period. (C) The value of the x-axis that corresponds to the 95% relative yield or an acceptable yield loss (AYL) of 5% is determined for both curves and related to crop growth stage (CGS). The CPWC is then defined as the time between the two crop growth stages (CGS_x to CGS_y) and represents the length of weed control required to protect the crop yield from more than a 5% yield loss. (Source: Knezevic et al. 2002).



Using the figure above determine the beginning and end of the critical period for weed control in potato for 5 and 10 % acceptable yield loss.

Weeds occurring before and after the CPWC have little effect on crop yield. Why would farmers choose to manage weeds outside of the CPWC?