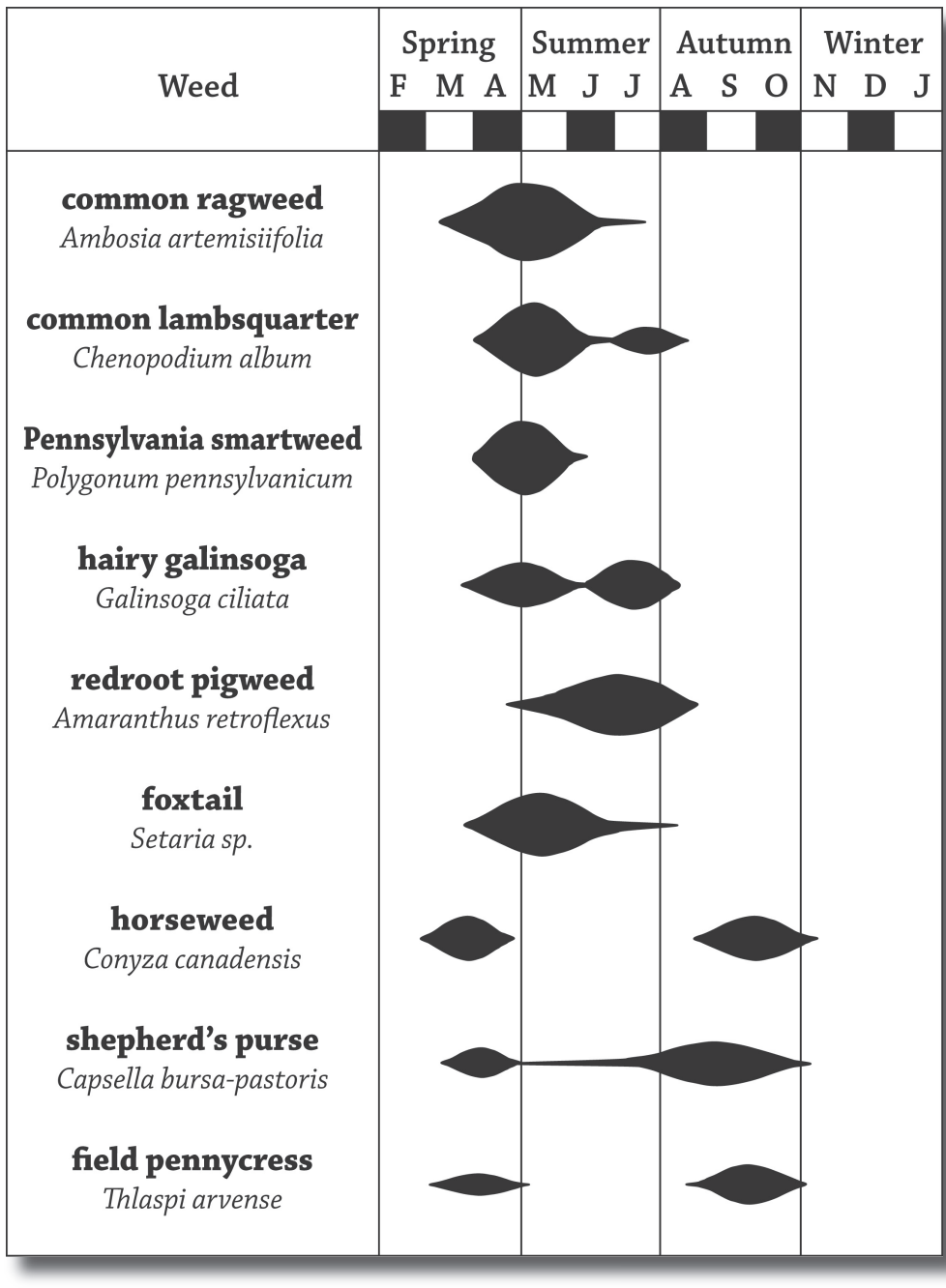
WEED GERMINATION PERIODICITY:

# When Do Weeds Wake Up?


## Tilling time *does* make a difference!

When we plant a grain or vegetable crop, we expect the seeds to germinate if the soils are warm enough and sufficiently moist. Seed germination for wild plants, including weeds, also requires sufficiently warm and moist soils, but in addition weed seeds possess controls that prevent seeds from germinating, called dormancy. Dormancy comes in a number of forms in weedy plants. Some seeds, like those of velvetleaf and morningglory, are hard-seeded. Here seeds remain "asleep" until the seedcoat is sufficiently etched by organic acids in the soil. Other seeds are sensitive to light, exhibiting the phytochrome response. Here, light quality, specifically a shift in the balance of near and far-red light, will wake seeds up (break dormancy). That shift in light or flash of light is provided by tillage. Weed seeds, like crop seeds, are genetically programmed to germinate once a minimum temperature is exceeded. Unlike crop plants, weed seed germination can be "turned off" once the germination temperature range is exceeded. Recent research on seed dormancy has revealed that weed seed dormancy operates like a combination lock with a number of tumblers that must be aligned for the lock to be opened, for weed seeds to germinate. In effect, each of the tumblers represents an opening and when these tumblers or openings are aligned, seeds germinate. These tumblers define the germination period for each weed species. These periods have been a subject of considerable study and we know that some species germinate in the fall of the year, some in early summer, while others germinate in mid and late-summer. If any of the tumblers aren't aligned, the seeds don't germinate at all, persisting in the soil weed seedbank. Weed seed can persist in a dormant state for several years to decades.

Time of field operations can take advantage of germination periodicity. Tilling the soil early will stimulate early summer annual weeds, such as common ragweed and common lambsquarters, to germinate. Tilling three or four weeks later results in little or no common lambsquarter and common ragweed emergence. The scientific basis for delayed planting as a weed management practice is called ***weed seed germination periodicity***. Planting later in the season takes advantage of the fact that many weed seed have "gone back to sleep" for the remainder of the field season.




**Proportion of weed seeds germinating throughout the season in central Pennsylvania.**

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