

## AlertInf

AlertInf advises farmers about the emergence of different weed species and helps to control the floristic situation and plan the treatments. The model provides the percentage of emergence reached by a given weed species in real time using meteorological data, such as soil temperature and rainfall.

The information provided by AlertInf is the percentage of weeds that have already emerged out of the total number of plants that may potentially emerge during the season. This information is useful for correctly timing the control, either chemical or mechanical, maximizing its efficacy and avoiding a further treatment, with a saving in time and money. If today AlertInf displays a low emergence percentage of a given weed, it means that the control treatment will only eliminate these few emerged plants and that the majority of the infestation can be expected to emerge afterwards, so another treatment will be required to avoid a crop yield loss. On the contrary, if the treatment is done when the estimated percentage of emergence is high, many weeds will be controlled and only a few will emerge later, so no second treatment will be needed.

For example, supposing that on date AlertInf shows an emergence of 20% in the field, on this basis, it can be predicted that many weeds (80%) will emerge over the next few days, so it would be advisable not to treat. Seven days later AlertInf indicates an average of 70% of emergence, so the decision can be made to treat. In this case, having waited for a week has meant significantly reducing the number of weeds that would have emerged later and so a second treatment is unnecessary.

### Important to remember

- AlertInf provides the percentage of emergence of the potential infestation in the field at the end of the season, this means that the model does not display an absolute number of plants per square metre but just a percentage. It is the farmer who must interpret the information on the basis of what he sees and knows about his own field.
- The model does not provide information on the phenological stage (number of true leaves) that the already emerged weeds have reached, whereas each herbicide has a phenological stage limit beyond which its efficacy is much lower. Therefore, once the percentage of emergence has been verified with AlertInf, it is important to check the phenological stage reached by the species in the field before deciding whether to wait a few days before treating.

### Technical information

The model is based on the hydrothermal time. All species accumulate hydrothermal time according to the soil temperature only when the soil water potential is above a base value. It is calculated as:

$$\text{GDD}_i = n * \max (T_{\text{smi}} - T_b, 0) + \text{SGDD}_{i-1}$$

Where:

$n = 0$  if the total rainfall in the past  $x$  days is lower than  $P_{\text{limit}}$ .

$= 1$  if the total rainfall in the past  $x$  days it is higher than  $P_{\text{limit}}$ .

$T_{\text{smi}}$  = the soil temperature given by the average of the daily temperatures at 0 and -10 cm.

$T_b$  = the base temperature.

$x$  = the number of days to consider for calculating the rainfall limit.

$P_{\text{limit}}$  = the minimum total rainfall during  $x$  preceding days required to produce emergences.

When hydrothermal time has been calculated, the cumulated emergence percentage is determined with a Gompertz equation:

$$ET = 100 * \exp(-a * \exp(-b * GDD))$$

where *a* represents a GDD lag before emergence starts, and *b* represents the rate of increase of emergence once it is initiated. *a* and *b* depend on the species.

Parameters used to calculate hydrothermal time and the Gompertz equation.

Weed species	T <sub>b</sub> (°C)	X (dd)	P <sub>limit</sub> (mm)
<i>Abutilon theophrasti</i>	3.9	12	4.5
<i>Amaranthus retroflexus</i>	12.6	10	5.0
<i>Chenopodium album</i>	2.6	10	0.5
<i>Polygonum persicaria</i>	5.0	10	0.4
<i>Solanum nigrum</i>	8.4	10	2.0
<i>Sorghum halepense</i>	12.3	10	1.6

## Questions and comments

We welcome your questions, suggestions and comments, so please do not hesitate to write to the following address:

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## Weed species

The model currently only gives information for six species, but another important weed species are now being studied, and will soon be added to AlertInf. In the following table are shown the species already present and those which will be added as soon as possible in the next versions. The studied species are important weeds of summer crops.

Specie infestante	Nome comune	Percentuale di emergenza
<i>Abutilon theophrasti</i>	<i>Velvetleaf</i>	X
<i>Amaranthus retroflexus</i>	<i>Redroot pigweed</i>	X
<i>Chenopodium album</i>	<i>Common lambsquarters</i>	X
<i>Digitaria sanguinalis</i>	<i>Large crabgrass</i>	
<i>Echinochloa crus-galli</i>	<i>Barnyardgrass</i>	
<i>Polygonum persicaria</i>	<i>Ladysthumb</i>	X
<i>Setaria glauca</i>	<i>Yellow foxtail</i>	
<i>Setaria viridis</i>	<i>Green foxtail</i>	
<i>Solanum nigrum</i>	<i>Black nightshade</i>	X
<i>Sorghum halepense</i>	<i>Johnsongrass</i>	X