Using Mustard and other Crops as a Biofumigant
What is Biofumigation?

is when decomposition of plant materials or animal products release volatile compounds with pesticidal properties.
Broccoli, cauliflower, Rapeseed, Mustard, and Horseradish contain organic compounds called glucosinolates. When the tissues of these plants are damaged, biologically active chemicals are produced. One of the most important compounds released is isothiocyanate (ITC).
At high concentrations ITCs are general biocides that behave much like commercial pesticides. Dazomet, Vapam, and Vorlex depend on an ITC as the active ingredient for pest control.

What Is Isothiocyanate (ITC). Low concentrations ITCs are considered beneficial to human health which can be detected in the pungency of horseradish and the spicy taste of hot mustard.
How do you Incorporate this tool into your Farm?

• You will need to have a Tractor,
• Seeder (Drill Or Broadcast)
• Flail Mower
• Tiller or Harrow
• Roller or Cultipacker
• Overhead Irrigation
Seeding

• At any time starting in spring to fall as long as there is sufficient moisture for quick germination.

• If seeds are broadcast, it is important to roll the field in order to have good seed to soil contact to ensure quick and vigorous germination

• Mustard should be seeded about 60 days before pest will be present in the field as mustard should be incorporated into the soil before seed
<table>
<thead>
<tr>
<th>Mustard Variety</th>
<th>Seeding Rate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caliente 199</td>
<td>10-12.3kg/ha(9-11lbs/ac)</td>
<td>Grows quickly and is typically used in spring or late summer, bred specifically for biofumigation as it contains very high levels of glucosinolates.</td>
</tr>
<tr>
<td>Caliente 61</td>
<td>5.6-7.8kg/ha(5-7lbs/ac)</td>
<td>Tolerant to drought and heat. It will not bloom prematurely when stressed; lower glucosinolate than Caliente 199; can produce more biomass under along photoperiod summer.</td>
</tr>
<tr>
<td>Caliente 119</td>
<td>10-12.3kg/ha(9-11lbs/ac)</td>
<td>Used in Maine trials; one of the first “Caliente” varieties.</td>
</tr>
<tr>
<td>Nemat/Caliente</td>
<td>5.6-7.8kg ha(5-7lbs/ac)</td>
<td>Can be planted in the spring; intended for improved nematode suppression; root exudates from Eruca sativa attracts nematodes to the upper soil profile; E. sativa is also an indicator plant of nematodes.</td>
</tr>
</tbody>
</table>
60+-/ days later

- Mustard should be watched and planed for incorporation into the soil.

- Should be incorporated before Full BLOOM!
In order to be successful with Biofumigation the following procedure must be followed rigorously!!!

• Prior to the actual incorporation, it is critical to chop and crushed as much plant material as possible to release the fumigant from plant cells. This can be done with a flail mower.

• Soil incorporation should be done in the morning or evening. Avoiding hot sunny days, and pollinator activity.
In order to be successful with Biofumigation the following procedure must be followed rigorously!!!

- Mustard must be incorporated IMMEDIATELY after mowing, 80% of the fumigant gas will be released in the first 20 minutes after mowing.

- For ideal incorporation, choose a tool that will place as much plant material as possible into the top 5 to 10 inches. Do not use a plow.
In order to be successful with Biofumigation the following procedure must be followed rigorously!!

- If possible, after incorporation the field should be rolled and packed to trap the fumigant gas in the soil.

- For small scale production systems and when possible, cover the area with a tarps to trap the gas in the soil. This will enhance the biofumigation effect.

- Rain or irrigation to create a better seal!
In order to be successful with Biofumigation the following procedure must be followed rigorously!!!

• Finally, once the incorporation process is complete,

• Leave the field undisturbed for 14 days to ensure that all the plant material can break down.

• Attempting to plant another crop before the 14 day period has passed will cause significant crop injury!

• If soil temperature is less than 50 deg, a longer post incorporation period maybe required for plant material to break down
Alternatives

• If you don't have the land or equipment, another option is Mustard seed Meal.
  • Mustard Meal
    • NPK4.50-1.50-1.15
    • OMRI Listed
• When managed properly mustard offers another tool to help growers control soil born pests and diseases.

• The use of mustard as a biofumigant is particularly interesting for organic producers.

• Another way to clean your soil!