

**CALIENTE MUSTARD - TECHNICAL BULLETIN****Natural Biological Fumigation**

Fumigation: *fu mi gate* v. *fu mi gat ed, fu mi gat ing, fu mi gates*  
 v. tr. To subject to smoke or fumes, usually in order to exterminate pests or disinfect.  
 v. intr. To employ smoke or fumes in order to exterminate or disinfect.

**Our approach:**

At Plant Health Care we take a scientific approach and then apply it practically to solve growing problems. This ethos has worked consistently with the products that we are supplying to growers daily, this is also being applied to the blending of our Caliente Mustards. We utilise a naturally produced 'fume' in the form of *Isothiocyanate (ITC)* that is a by-product from cell breakdown of the Caliente Mustard.

We are taking the best and most active varieties and blending them to give the maximum effect for the grower. The blends are able to be tailored to the geographic and climatic conditions as well as the end requirement, whether the need is for biomass production or biofumigation (control of weeds, pests and pathogens).

**The process:**

*Caliente Mustard is not a simple cover crop!*

PHC Caliente Mustards contain two types of cover crop which produce in their cells specific chemicals called *Glucosinolates (GSL)* and an enzyme called *Myrosinase*. In the cell these are separated, however when the plant is macerated and mixed with water (a hydrolysis reaction, therefore water is crucial) the two are mixed to produce *Isothiocyanate (ITC)* gas. ITC is very similar to the gas produced by *Dazomet (Basamid)* which is *Methyl-Isothiocyanate*.

To achieve the desired results the Caliente Mustards must be grown as any other crop, watered and nourished.

**Seeding Rate:** Seed rate will depend on the specific blend and your soil type.

**Planting Depth:** The crop should be ideally planted at a depth of around 5mm, and certainly no greater than 10 mm, as it is a small seed and may vary consistency of germination if planted deeper.

**Fertilization:** Depending on the soil type and the available nitrogen levels, the crop should have all the required 125 kg/Ha of nitrogen (N) incorporated within the seedbed with a 4:1 mix of available sulphur (important for the production of GSL). *Except in areas of high leaching - contact PHC for advice.*

**Establishment:** With adequate irrigation the crop will establish very fast out-competing any weeds. It will then take 6 - 12 weeks, depending on climatic conditions, before the crop is ready for incorporation.

**Pulverization:** Cellular breakdown is essential for the release of GSL and Myrosinate, which leads to the production of ITC. As a guide, pulverize the entire plant 10 - 20 days after the first flowers are visible. Incorporated into the ground immediately and irrigate to start the biofumigation process.

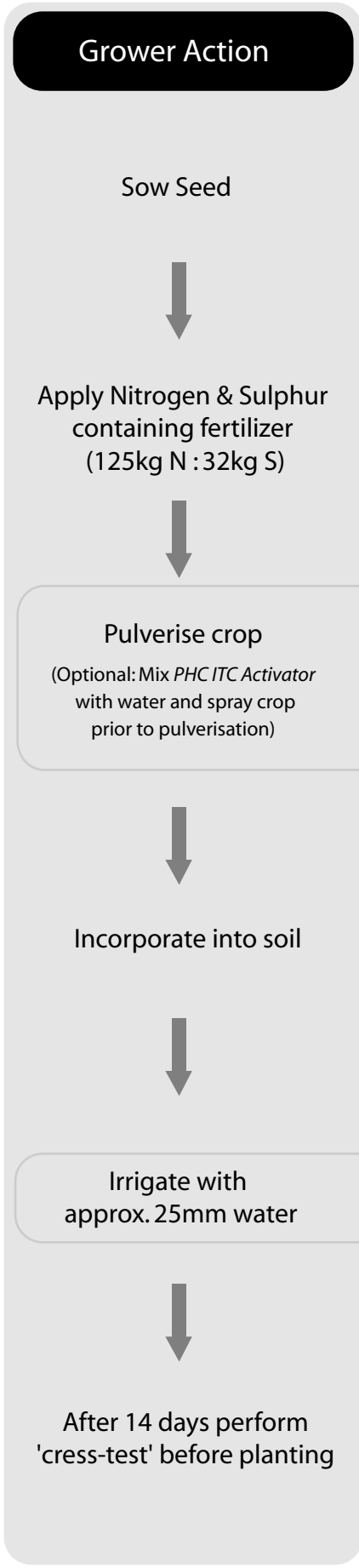
*Note: this is the time to add the PHC ITC Activator at a rate of 500g/Ha. by spray.*

**Irrigation:** Water is essential for the conversion of GSL to ITC, without it the biofumigation process will not continue. Irrigate with around 25mm water, ideally on a damp day.

**Replanting:** After 14 days ideally perform a cress test on the ground and then drill as soon as possible to gain the best results.

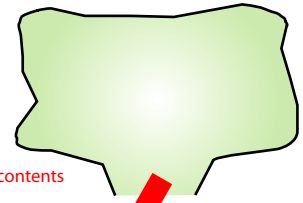
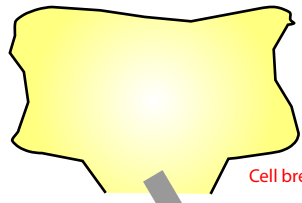
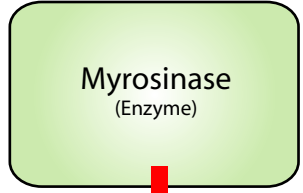
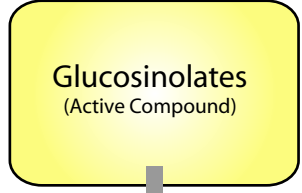


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*Brassica juncea*  
(84% of mix)

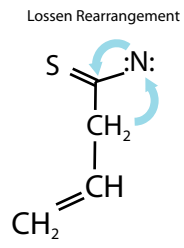
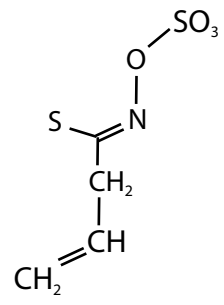
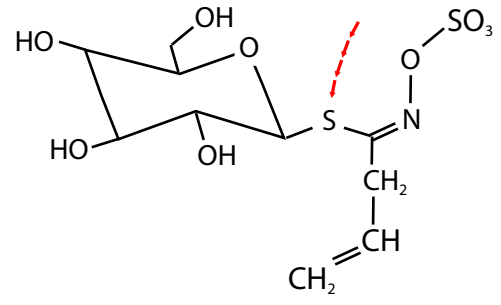
*Sinapsis alba*  
(16% of mix)



Cell breakdown releases contents

Glucosinolate - Sinigrin

Myrosinase



**Isothiocyanate**

S=C(N)C=C

**ITC**

