

## **Safety and Regulatory Issues Associated with Herbal Flavored Vinegars and Oils**

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One of the easiest value-added uses of fresh herbs is in flavored vinegars and oils. There has been a tremendous increase in the popularity and availability of these products. However, there are a number of things processor's must be aware of

before embarking into this area.

All food products must be prepared following the requirements laid out in 21 CFR 110 Code of Federal Regulations, which describes the "Good

Manufacturing Practices” (GMP’s) for production, storage, and distribution of human food. These include the requirements for preparation facilities, sanitation, and protection of food. These regulations are available on the internet or from your local California Department of Health Services Food and Drug Branch Office. All food manufacturing facilities in California must register with the Department of Health Services on an annual basis.

### **Herbs in Vinegar or Pickled Vegetables?**

Vinegar is considered to be an acid food. When small amounts of herbs are added to vinegar they will, over time, become fully acidified throughout and they should not contribute to a change in the acidity or pH of the vinegar solution. If these two things happen the “flavored vinegar” remains an acid food. The acidity of the vinegar makes this a low risk food. Eventually, as the amount of low-acid plant material increases in proportion to the vinegar, a point is reached where the pH of the vinegar is effected. At this level the product is no longer a “vinegar” but is an acidified low-acid vegetable or pickle.

The regulations are different for acidified herbs and acid foods. There are public health implications of acidifying a low acid vegetable because a mistake could cause botulism. Manufacturers of acidified low-acid vegetables or herbs must be in full compliance with 21 CFR 114, which is the regulation governing acidified foods. The product formulation and process will need to be submitted to the FDA (California Department of Health Services in California). The product will have to be processed under the supervision of a certified operator who has successfully completed a course at an FDA-approved school. UC Davis offers the “Better Process Control School” once per year in Davis. The goal is to achieve a pH in the low-acid components that is consistently and reliably at 4.6 or below.

### ***Clostridium botulinum* and botulism**

Most vegetables are classified as low-acid or having a pH of greater than 4.6. These products will support the growth of the bacterium *Clostridium botulinum* and its toxin production of WHEN GIVEN THE RIGHT CONDITIONS. These conditions include high moisture levels, absence of oxygen and a pH of greater than 4.6. Botulism has

resulted from improperly prepared and stored garlic-in-oil mixtures and roasted eggplant in oil. Moisture, room temperature, lack of oxygen, and low-acid conditions all favor the growth of *Clostridium botulinum*. When growing, this bacterium produces an extremely potent toxin that causes the illness botulism. The toxin binds to nerve cells blocking their function. The result is increasing paralysis which, if untreated, can lead to death within a few days of consuming the toxic food.

### **Herbs or vegetables in oil**

Another popular product category is oils flavored with vegetables or herbs. These can be sold as flavored oils, pesto sauces which are a blend of ground fresh herbs, dried cheese, and oil, roasted peppers or eggplant covered in oil.

As mentioned above, outbreaks of botulism have occurred with chopped garlic and oil mixtures as well as improperly heat processed roasted eggplant covered in oil. It is assumed that any low-acid plant material could support the growth of *Clostridium botulinum* especially given the anaerobic conditions provided by the oil, the moisture from the vegetable, and typical room temperature storage of these products. While refrigeration provides some barrier to the growth of *C. botulinum*, manufacturers should not rely on refrigeration alone.

There are a number of options which will allow safe production of these products. Low acid plant materials can be dried prior to addition to the oil. Herbs that are properly acidified to below pH 4.6 can also be added. However, properly acidified herbs must be produced in a facility licensed to produce acidified low-acid vegetables (see above). The exception is dried tomatoes. Tomatoes are considered to be acid foods and the combination of low pH and low moisture is unfavorable to the growth of *Clostridium botulinum*.

Researchers at UC Davis in cooperation with the UC Laboratory for Research in Food Preservation in Dublin, CA are currently evaluating the risks of botulism associated with flavored or infused oils which are filtered and sold without particulates.