



# 1,3,5-Undecatriene

This powerful green note is equally at home in roasted and raw varieties of bell pepper and jalapeño flavors.

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**T**he problem with favorite ingredients in cooking is that they tend to squirrel their way, almost unnoticed, into so very many dishes. My own cooking suffers from this fault in respect to peppers—any kind of peppers. I find the whole plant family fascinating, but ripe red bell peppers and tangy green jalapeños tend to insinuate themselves into way, way too many of my dishes.

1,3,5-Undecatriene (FEMA# 3796, CAS# 16356-11-9) is remarkably reminiscent of peppers, especially ripe bell peppers. Very few raw materials, smelled alone, conjure up such a vivid impression of a natural product. It is a very powerful green note but, paradoxically, it seems equally at home in roasted and raw varieties of bell pepper and jalapeño flavors. This fascinating raw material has a moderately wide distribution in nature, but its uses in flavors far outstrip its relatively modest natural occurrence.

The dose rates given throughout this article are the levels suggested for use in flavors that are intended to be dosed at 0.05% in a ready-to-drink beverage or in a simple bouillon.

## Vegetable and Herb Flavors

**Bell pepper:** The ideal level of addition of 1,3,5-undecatriene to bell pepper flavors varies depending on the profile of the flavor, but 40 ppm is a good starting point.

**Parsley:** Fresh parsley leaves have an interesting and quite unexpectedly complex character, and this raw material adds significant realism at 40 ppm.

**Cucumber:** Traditional cucumber notes work well enough, but they are usually much lighter and thinner tasting than the real thing. Adding 25 ppm of this raw material adds depth and authenticity.



**Jalapeno pepper:** Jalapeno pepper flavors, like bell pepper flavors, can accommodate quite varied levels of this raw material, but the ideal level of addition is a little lower, around 25 ppm.

**Celery:** A fresh celery stalk profile, as opposed to that of dried seeds, is recreated by adding this component at 25 ppm to celery flavors.

**Cilantro/coriander leaf:** A level of 5 ppm is best for coriander leaf flavors, adding welcome depth and authenticity.

**Green bean:** Methoxypyrazines are much more specifically characteristic of green beans than 1,3,5-undecatriene but, nevertheless, a modest addition of 2 ppm of this raw material can add realism.

**Olive:** A similarly subtle 2 ppm addition can help to make this difficult flavor category more complex and interesting without pushing the profile too far in the direction of bell peppers.

**Curry leaf:** This highly elusive flavor category is slowly becoming more popular but is quite hard to recreate realistically. A level of 2 ppm of 1,3,5-undecatriene is very effective.

## Savory Flavors

**Crab:** Crab flavors should contain a distinct green note, but finding the right combination of green notes is challenging; strongly cucumber notes are helpful, but end up tasting too thin. The addition of up to 40 ppm of 1,3,5-undecatriene to the green profile mix works very well.

**Chicken:** The first surprise when trying out 1,3,5-undecatriene in flavor categories quite removed from bell peppers is that it works surprisingly well in many meat flavors. This is especially true of all the different variations on the eternally popular theme of chicken, starting at around 25 ppm.

**Prawn and shrimp:** A similarly notable effect can be achieved in prawn, shrimp and lobster flavors with the addition of 25 ppm of this material.

**Salmon:** Slightly lower levels of addition, around 15 ppm, work better in both cooked and smoked salmon flavors, rounding out the profile and adding realism.

**Roast beef:** This ingredient has a much more subtle effect in roast beef

flavors, and the ideal addition is 5 ppm, adding depth and complexity.

**Pork:** A small addition, around 2 ppm, adds welcome complexity to the whole gamut of pork-derived flavors, from bacon to roast pork to cured ham.

## Citrus Flavors

### **Mandarin, clementine and tangerine:**

If the usefulness of 1,3,5-undecatriene in meat flavors was a surprise, then the equally great affinity to citrus flavors is scarcely less surprising. Mandarin flavors especially benefit from this raw material, ideally added in the region of 5 ppm.

**Orange:** The effect in orange flavors is similar, but the ideal level of addition is lower, around 1 ppm, unless the flavor has a distinct tangerine component.

**Lemon and lime:** Both lemon and (cold-pressed) lime flavors can use a level of 1 ppm of 1,3,5-undecatriene, similar to orange flavors, adding freshness and a peely character.

**Grapefruit:** A much subtler effect is all that is required in grapefruit flavors, with the addition of about 0.5 ppm.

## Other Fruit Flavors

**Rhubarb:** This is an interesting and, at first sight quite simple, flavor category. Appearances are deceptive; getting true realism is not so easy. This ingredient can be useful at a wide range of levels, up to 50 ppm.

**Peach:** Thiazoles add a good proportion of the attractive “fuzzy” nuance of fresh peach skin, but they do not entirely capture the effect. 1,3,5-Undecatriene

helps round out this note in peach flavors at around 40 ppm.

**Pineapple:** Similar levels of addition of this raw material, around 40 ppm, can transform the most mundane of pineapple flavors into something far more authentic and juicy.

**Passion fruit:** Forty ppm is also the close-to-ideal level in passion fruit flavors, where the effect is very closely allied to that in pineapple flavors, adding juiciness.

**Blackcurrant:** Levels of use in blackcurrant flavors depend on the type of flavor, but should be in the region of 40 ppm in authentic flavors, less in more buchu-oriented creations.

**Watermelon:** The usefulness of this ingredient in watermelon flavors is dictated by the character of the flavor. Tutti frutti-style flavors scarcely benefit, but more realistic flavors can be improved and deepened by the addition of 30 ppm.

**Grape:** Grape flavors can all use about 10 ppm of 1,3,5-undecatriene, adding complexity, juiciness and reducing the dominance of anthranilates in Concord grape flavors.

**Redcurrant:** The effect of this ingredient in redcurrant flavors is to add realism and complexity, along with a modest skin note, at levels of about 8 ppm.

**Pomegranate:** This is another flavor that is increasing in popularity but can be quite difficult to capture realistically. Five ppm of 1,3,5-undecatriene can help immensely.

**Apricot:** Apricot flavors have a generally similar composition to peach flavors,

but with less emphasis on the skin character. Consequently, the best level of addition is lower, around 4 ppm.

**Apple:** Skin notes are also helpful in apple flavors, and this ingredient performs well at levels of 1-5 ppm, depending on the type of profile desired.

## Other Flavors

**Green tea:** Quite high levels of addition, around 30 ppm, can be surprisingly effective in green tea flavors. Even higher levels work well if the profile target is one of the more assertive Japanese green teas.

**Vanilla bean:** The never ending quest for really authentic tasting vanilla bean flavors is littered with surprising effects from very small levels of component addition; this ingredient is no different, adding significant authenticity at only 10 ppm in vanilla bean flavors.

**Ginseng:** A level of 10 ppm of this ingredient is also remarkably effective in adding realism and depth to ginseng flavors.

**Black tea:** Compared to green tea flavors, 1,3,5-undecatriene is almost a secondary ingredient in black tea flavors, but it is still surprisingly effective at around 2 ppm.

**Gin:** Gin flavors can easily taste thin and concocted if they are simply based on essential oils. The use of about 5 ppm of 1,3,5-undecatriene only gives a subtle effect, but it does add attractive depth.

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