Interesting WONF Ingredients

Hop oil, China star anise oil and jasmine absolute in a range of flavor uses

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Many natural raw materials can be very useful in artificial flavors, but they are even more helpful when formulating challenging natural WONF flavors. In fact, they typically provide three important benefits.

- They often contain notes that are difficult to find from single chemicals.
- They add a subtle layer of complexity to flavors that start off a little too simplistic.
- And they can make the flavor much harder to match, especially if they are unusual or are used in clever combinations.

The following ingredients, in my experience, can all be useful in a wide range of different flavor types and merit inclusion on any flavorist's shelf. All of them are FEMA GRAS listed, but please note, the components listed are not comprehensive. They have been selected either because they are present in significant quantities or because they contribute significantly to the odor of the raw material. The quantities given are all typical rather than specific and often vary widely in practice, even in genuine oils. Also, all the use rates of these natural raw materials are expressed as parts per million in a finished flavor that is intended for use at 0.05% in a ready-to-drink beverage or bouillon.

Hop Oil

Myrcene (FEMA# 2762, CAS# 123-35-3; mango)—35%

Humulene (CAS# 6753-98-6; carrot)—29%

Caryophyllene (FEMA# 2252, CAS# 87-44-5; carrot)—11%

Methyl dec-4-enoate (CAS# 7367-3-1; tropical)—1%

Hop oil (*Humulus lupulus* (Moraceae) has a unique and highly unusual character. Thankfully, it does not have any bitter character when it is used in flavors. It finds its major use at quite high levels in beer flavors, but at much lower levels, it can add an interesting nuance to quite a number of flavor types.

Malt: This ingredient is especially well suited for use in malt flavors and helps to round out an aroma profile that could otherwise be too simplistic. Around 40 ppm of hop oil in a malt flavor adds realism to the character of the flavor. Rather less, around 15 ppm, is more appropriate for malted milk flavors.

Ginger: Ten ppm is a good starting point in ginger flavors. At this level hop oil adds pleasant complexity, particularly in dry ginger flavors for beverages, where it helps to counterbalance the dominant citrus element.

Mango: Ten ppm is also a good level when used in combination with myrcene, for example, to add authenticity to the skin note in mango flavors. Higher levels can be used if hop oil is used alone.

Pear: Pear flavors can benefit from subtle additions of hop oil, starting around 5 ppm, and higher if a more obvious skin note is required.

Passion fruit: Low levels, in the region of 5 ppm, are quite effective to add depth and realism to passion fruit flavors.

Blackcurrant: Five ppm of hop oil adds a subtle skin note to blackcurrant flavors, providing something of the character of blackcurrant buds absolute without the catty note.

Banana: Once again, 5 ppm is the optimum level in fresh banana flavors to add depth and realism.

China Star Anise Oil

Anethole (FEMA# 2086, CAS# 4180-23-8; anise)—87%

Limonene (FEMA# 2633, CAS# 5989-27-5; citrus)—8%

Anisaldehyde (FEMA# 2670, CAS# 123-11-5; hawthorn)—1%

Linalol (FEMA# 2635, CAS# 78-70-6; lavender)—0.8%

Methyl chavicol (FEMA# 2411, CAS# 140-67-0; tarragon)—0.5%

China star anise oil (*Illicium verum* Magnoliaceae) is much more widely used than true anise seed oil and forms the basis of most aniseed flavors. It is also used at high levels in many toothpaste flavor blends. At lower levels, despite its relative lack of complexity, it is very useful in licorice and a number of other flavors.

Licorice: Levels of use can vary widely, but 10,000 ppm is a good place to start trials in a licorice flavor aiming at an authentic character.

Root beer: Root beer flavors have depended on this essential oil for much of their character for many

years. Two-thousand ppm is a good initial level.

Dandelion and burdock: This UK profile was similarly affected by the demise of sassafras oil and is now primarily characterized by star anise. Two-thousand ppm is, again, a good starting level.

Rum: The character of aniseed in rum flavors need only be subtle and levels of use around 50 ppm in a flavor are quite effective.

Blueberry: Twenty ppm of star anise oil is helpful in blueberry flavors, adding depth and softening the profile significantly.

Cherry: Cherry flavors vary radically in character but many of them can usefully incorporate an aniseed note. Use rates vary, but 20 ppm is a good starting point.

Blackberry: This oil can be used in a number of berry fruit flavors, especially blackberry. Ten ppm is a good starting level.

Strawberry: Only a subtle effect is needed in strawberry flavors, and 5 ppm can be quite sufficient.

Jasmine Absolute

Benzyl acetate (FEMA 2135, CAS# 140-11-4; berry)—11%

Linalol (FEMA# 2635, CAS# 78-70-6; lavender)—3%

cis-Jasmone (FEMA# 3196, CAS# 488-10-8; waxy)—1.4%

Methyl jasmonate (FEMA# 3410, CAS# 39924-52-2; jasmine)—0.9%

Indole (FEMA# 2593, CAS# 120-72-9; animalic)—0.5%

Jasmine absolute (*Jasminum officinale* Oleaceae) consists of a uniquely harmonious melange of fruity, floral and animalic notes that can be used very widely indeed in flavors. It can certainly add naturalness and complexity when needed, but it also gives a unique lift to many flavor profiles.

Raspberry: All the main components of jasmine absolute form a useful part of the character of raspberries, and the absolute is invaluable at levels ranging from 25 ppm to 100 ppm and higher.

Blackberry: This component is only marginally less vital in blackberry flavors, and 50 ppm is generally a good starting point.

Black tea: Jasmine tea flavors can contain high levels of jasmine absolute, but this component is also very useful in black tea flavors at around 50 ppm. At this level no obvious jasmine character is imparted but the tea note is rounded and made much more subtle.

Blueberry: In a similar way, many of the components of the absolute blend harmoniously into blueberry flavors. Twenty-five ppm is a typical level of use in this flavor category.

Pineapple: The use of jasmine absolute in pineapple flavors is rather less obvious but good effects can be obtained, especially to add depth of taste, at around 20 ppm.

Gooseberry: Gooseberry flavors can also easily tend to be too light and ethereal. The addition of around 10 ppm of the absolute adds realism and depth.

Kiwi: Much the same comments apply to kiwi flavors, but the ideal level of use is rather lower in this very subtle profile, around 5 ppm.

Lemon: As a natural source of methyl jasmonate, this absolute can lift lemon flavors and add to the juicy character. The fruity, berry note is also helpful, but only at low levels. This restricts the ideal level of use in lemon flavors to around 5 ppm.

Lime: Jasmine absolute is more useful in cold pressed than in distilled types of lime flavors. The level of use is similar to lemon, around 5 ppm.

Guava: Jasmine absolute can be used at quite high levels in guava flavors, but the optimum level in my opinion is around 5 ppm.

Strawberry: Methyl jasmonate is once again the most helpful aspect of the absolute in strawberry flavors. Levels of use can vary quite dramatically, but perhaps the most helpful level is quite low, around 2 ppm.