

Collateral Metabolites of the Aminosulphuric Acids in the *Allium* Plants

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Allium cepa, *Allium sativum* and other representatives of *Allium* species contain 1–5% of non-proteic secondary biometabolites of the aminosulphuric acids. Some studies have demonstrated that stable precursor of the antibacterial principle of Cavallito is S-oxide (+ / -)-2-propenylcystein S (2). In the intact cell (2) S-oxide (Figure 1) of the S-alchenilcysteine (smell and flavor precursors) are located in the cytoplasm, while C-S lyase enzyme, in vacuole [1]. Following cell lysis takes place alpha / beta-elimination of the S-oxides allowing volatilization of low molecular weight such as organosulphur biocompounds (1).

In the *Allium* species four S-oxides appear: S-oxide S 2-propenyl, S-(E)-1-propenyl, S-methyl S-propyl-L-cysteine. *A. cepa* containing compounds (5–7) while *Allium sativum* containing substance (2), (5) and (6). Distinct plant flavors of *Allium* spp. reflect the variety of biocompounds, in particular the biocompound (5) ("isoallyl") which is the precursor of the lachrymatory factor *A. cepa* and the biocompound (2) which is a precursor to allyl biocompounds in characteristic *A. sativum*. *Allium* spp. plants contain gamma-glutamyl peptides 24 amino-aliphatic acids. Their main function is assumed to be the storage of nitrogen and sulfur biocompounds [2], and may play a role in the transport of amino acids through cell membranes. In the (Figure 2) is presented the biosynthesis of the peptides and flavor precursors based on experiments in which was induced *A. cepa* SO₄²⁻. Boiling the bulb of the plant or homogenizing the plant with alcohol, enzymes of *Allium* spp. may be disabled.

Sulfate is reduced and assimilated into the cysteine of the chloroplast to enter in the glutathione cycle. The addition of gamma-glutamyl-L-cysteine in the methacrylic acid can lead to the gamma-glutamyl-S-1-propenylcysteine, S-oxide oxidation gamma-glutamyl-S-1-propenylcysteine, followed by cleavage of gamma-glutamyl trans peptidase from the biocompound (5). Boiling the bulb of the plant or homogenizing the plant with alcohol, enzymes of *Allium* spp. may be disabled [3]. Sulfate is reduced and assimilated into the cysteine of the chloroplast to enter in the glutathione cycle. The addition of gamma-glutamyl-L-cysteine in the methacrylic acid can lead to the gamma-glutamyl-S-1-propenylcysteine, S-oxide oxidation gamma-glutamyl-S-1-propenylcysteine, followed by cleavage of gamma-glutamyl trans peptidase from the biocompound (5).

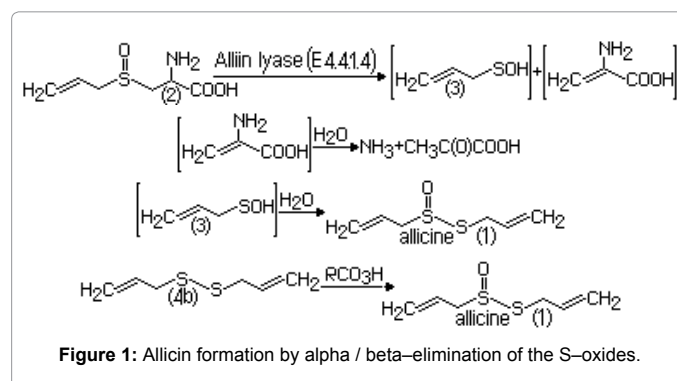
Other experiments have demonstrated that the precursor (8) was converted to the precursor (5)-3-atom loss of the pro-R hydrogen and oxidative decarboxylation reaction occurs to the geometry anti analogously to the biosynthesis of terminal alkene (Figure 2) [4]. Parallel Processes involving the Michael addition of methacrylic acid, glutathione, resulting S-2-carboxy-glutathione (a), followed by conversion of the latter biocompound (8) and methylation of the resulting glutathione S-methylglutathione (b) followed by conversion of finally the gamma-glutamyl-S-methylcysteine (f). For *A. sativum*, the situation is less clear. The gamma-glutamyl-S-2-propenylcysteina (c) formed from the precursor (8) or serine and more particularly from 2 propenol, a process to be elucidated; it is converted to gamma-glutamyl-S-S-2-propenylcysteine oxide (g) by oxidase and is then cleaved

in the gamma-glutamyl-transpeptidase (2). It has been reported that the concentration of gamma-glutamyl-S-(S)-1-propenylcysteine (s) and gamma-glutamyl-S-2-propenylcysteine (c) gamma-glutamyl peptide prevailing in homogenates of fresh *A. sativum*, decreases when freshly picked *A. sativum* stored at 4°C [5]. The result of the storage of *A. sativum* in cold place is production of (5) and therefore the low molecular weight biocompounds containing organosulphur 1-propenyl group. Also, the *A. sativum* grown in cold climates contain much smaller amount of the biocompound (6) than in the temperate climates *A. sativum* increased, even though precursor biocompounds such as gamma-glutamyl-S-methylcysteine (7) are in the normal range.

Attraction / Repellent Effects on Insects and Animals

Propantion sulfinat propyl, was identified as the most attractive biosubstance of crushed leaves of *Allium porum* (leek moths or *Acrolepiopsis assectella*, the caterpillars feed within the foliage and stems or bulbs of *Allium* spp. plants and related vegetables.). Propantion sulfinat propyl rejects *Ephestia kuehniella*. Allicin, counterparts like sulfur biocompounds *Alliaceae* protect species of pathogens and predators. Concentrations of 2 ppm of garlic oil components / metabolites diallyl disulfide trisulfide are toxic for mosquito and for larva of other insect and reject *Ixodes ricinus*, the tick carrier encephalitis virus [6].

Diallyl disulfide was also used for removal of a bird of prey cereal crops.



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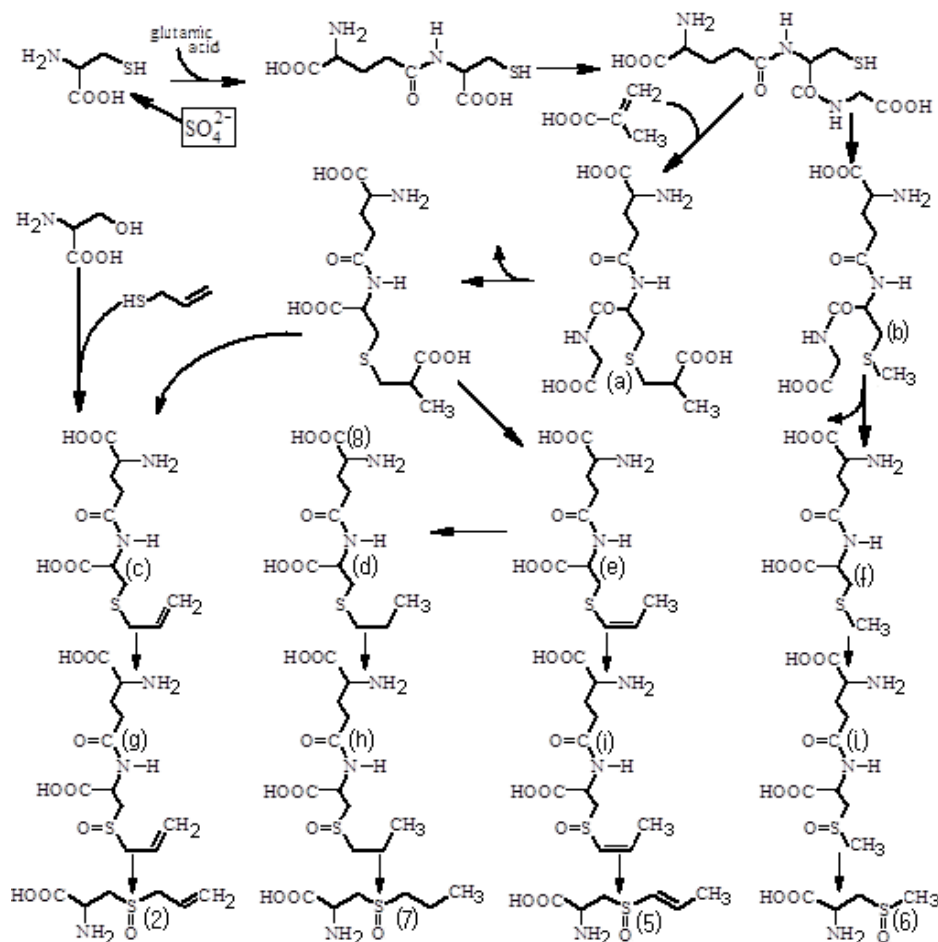


Figure 2: Biosynthesis of the peptides and flavor precursors based on experiments in which was induced SO_4^{2-} *Allium cepa*.

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