

CAPSICUM ANNUUM L.



Foto di R. Longo

Capsicum annum (Solanaceae)

Massimo De Vincenzi*,
Francesca Maialetti*,
Marco Silano**

* Department of Metabolism and Pathological
Biochemistry, Istituto Superiore di Sanità,
Roma, Italy

**Hospital "Bambin Gesù",
Rome, Italy

Per l'introduzione alla rubrica,
fare riferimento al fascicolo di maggio 2002

*The introduction to this section
is in the edition of May 2002*

SYS NAME:	Capsicum annum L.
CE No:	107
STEINMETZ No:	240
FEMA:	/
ORDER:	Tubiflorae
FAMILY:	Solanaceae
NAME:	E: Red pepper, Spanish pepper F: Poivre d'Espagne D: Paprika, Spanischer pfeffer I: Peperone, pepe cornuto
SYNONYMS:	C.annuum L.var.Longum Sendt; C.Cerasiforme.Lamk.; C. Longum DC.
PARTS USED:	Fruit
IMPORTANT CONSTITUENTS:	capsaicin (1.67mg/gdry wt), dihydrocapsaicin, nordihydrocapsaicin, homocapsaicin, apigenin, solanine, solanidine, luteolin-7-o-(-apioglucoside, hexadecane, heptadecane, limonene, trans- ocymene, naphthelene, hexanol, cis-3-hexanol, linalool, hexanal, trans-2-hexanal, cis-3-hexanal, benzaldehyde, 2-heptanone, trans-2-hepten-2-one, nonen-4-one, isophorone, (-ionone, hexyl-butylate, 2-ethylfuran, 2-pentylfuran, 3-iso-butyl-3-methoxyprazine, (-sitosterol, stigmaterol, cycloartenol, (-amirin, capsanthin (1-6).
ACTIVE PRINCIPLES:	Capsaicin (III)
OTHER CONSTITUENTS OF TOXICOLOGICAL CONCERN:	
PRODUCTS IN WHICH USED:	sweet peppers used for salade, pickles and meat dishes.
LEVEL OF USE:	Extract: baked goods 295.0 ppm, frozen dairy 330.0 ppm, meat products 197.8 ppm, condiment, relish 870.0 ppm, soft candy 450.0 ppm, gelatin, pudding 115.0 ppm, soups 1266.0 ppm, nonalcoholic beverages 167.3 ppm, alcoholic beverages 1200. ppm, hard candy 6.25 ppm.; Paprika: baked goods 641.7 ppm,breakfast cereals 641.0 ppm, other grains 3100. ppm, fats, oils 6117. ppm, milk products 377.0 ppm, cheese 257.0 ppm, meat products 4629. ppm, processed vegetables 9234. ppm, condiment, relish 3793. ppm, soups 167.9 ppm, snack foods 5235. ppm, nonalcoholic beverages 1160. ppm, nut products 4600. ppm, gravies 467.0 ppm; Paprika oleoresin: baked goods 64.41 ppm, other grains 200.0 ppm, fats, oils 1943. ppm, cheese 630.0 ppm, frozen dairy 4.99 ppm, meat products 227.6 ppm, fish products 1000. ppm, processed vegetables 226.8 ppm, condiment, relish 840.2 ppm, soft candy 4.99 ppm, gelatin, pudding 5.00 ppm, soups 13890 ppm, nonalcoholic beverages 29.99 ppm, alcoholic beverages 20.00 ppm, nut products 720.0 ppm, gravies 922.2 ppm.

PREPARATION: extract, tincture, oleoresin

MAIN TOXICOLOGICAL DATA: oral administration of 50mg/Kg b.w./capsaicin, or 0.5gm/Kg b.w./day capsicum fruit crude extract for 60 days, reduced significantly the gain in body weight. The reduction in body weight gain was more marked in rats fed with capsicum extract (8). In a 13-week toxicity study, nephrotoxicity was seen in male mice in the 1% dose group (21). There are conflicting data on the mutagenic activity of capsaicin and chili extract in bacterial systems. Both substances have been reported to be non mutagenic in bacteria (9,10). But capsaicin was subsequently reported to show a low level of mutagenic activity in TA98 strains of Salmonella in the presence of an Aroclor-induced activating system (11), and more recently to have higher mutagenic activity in this system (12). Certain fractions from extracts of Capsicum fruit have been found to possess profound clastogenicity as determined by induction of micronuclei in the mouse bone marrow cells (20). In the latter study has been reported a significant increase in bonemarrow micronuclei in the mouse at a dose of 7.5 but not at 1.8mg/Kg b.w. of capsaicin (12). In the other study, capsaicin administered intraperitoneally to adult mice at dose of 0.4, 0.8 or 1,6 mg/Kg b.w./day on five consecutive days, did not induce any mutagenic effect in male germ cells in vivo, studied using the sperm morphology assay and the dominant-lethal test (13). Chilli is reported to act as a promoter of hepatocarcinogenesis (14) and to produce hepatomas when fed at the 10% level in the diet (15). Further chilli and capsaicin have been shown to produce cirrhosis of the liver (15), damage to duodenal mucosa (16), and gastric ulcers which probably develop into intramucosal cancer of the skin (17). Moreover, has been reported an increased incidence of adenocarcinoma of the duodenum as a result of feeding 0.0625-1% capsaicin in the diet of mice for 35 days (11). Capsaicin has powerful actions on peripheral sensory C fibres; in some cases, central neurones or small myelinated fibres may also be affected (18). In a population-based case-control study conducted in Mexico City, chili peppers consumers were at high risk for gastric cancer compared with non-consumers (19). In a study with B6C3F1 mice fed a mixture of capsaicinoids at levels of 0.0025, 0.0083 and 0.025% for 79 wks, a few jejunal and colonic tumors developed in both treated and control group, but capsaicinoids treatment did not increase their incidence (21).

DATA NEEDED: Further studies are required to clarify the renal/carcinogenicity of capsaicinoids reported in male mice.

MAIN REFERENCES: 1. J.Chem.Soc.,442,1968; 2. J.Agr. Fd.Chem., 17,1323,1969; 3. Food.Sci.,36,858,1971; 4. Planta Med.,36,61,1979; 5. J.Chromatogr.,189,389,1980; 6. J.Am.Oil Chem.Soc.63,1172,1986; 7. J.Agr.Fd.Chem.,34,770,1986; 8. Res.Comm.in Chem.Pathol.and Pharmacol.,41,95,1983; 9. J.Fd.Sci.,47,330,1981; 10. Nutr.Cancer,1,10,1979; 11. Anticancer Res.,4,117,1984; 12. Envir. Mutagen.,10,321,1985; 13. Fd. Chem. Toxicol. 26,955,1988; 14. Acad. Nank. Gruz.SSR. Soobschride,65,237,1971; 15. CRC Crit.Rev. Toxicol.10,321,1982; 16. Digest. Dis. Sci.19, 439,1974; 17. Gann., 3,141,1968; 18. Pain,15,109,1983; 19. Am. J. Epidem. 139, 263, 1994; 20. Mutat. Res. 312, 151, 1994; 21. Fd. Chem. Toxicol. 36, 1065, 1998.

CLASSIFICATION AND LIMITS: Fruit cat 3 (with limit on capsaicin)
Cat 3: plants, animals and other organisms, and parts of these or products thereof, normally consumed as food items, herbs or spices in Europe which contain defined iactive principles^s or iother constituents of toxicological concernⁱ requiring limits on use levels.
Flavouring preparations, which are not themselves consumed as food but which are derived from plants, animals and other organisms and parts of these or products thereof, normally consumed as food items, herbs or spices in Europe which contain defined iactive principles^s or the iother constituents of toxicological concernⁱ are not exceeded.

LIMITS AS TOTAL CAPSAINOICIDS:
Food: 5 ppm
Beverages: 5 ppm
Hot foods and beverages: 10 ppm
Exceptions: (Condiments and sauces)
Hot ketchup: 20 ppm
Tabasco, harissa, hot pimento oils and similar preparation: 50 ppm
Capsaicin: TDI 0-02 mg/kg/b.w., expressed as total capsainoicids.

NATIONAL/INT. EVALUATIONS: Capsicum annum L.: CFR 73.340, 182.10, 582.10.
Capsicum annum L. extract: CRF 182.20, 582.20; FEMA No. 223.
Capsicum annum L. oleoresin: CFR 73.345, 182.20, 582.20; FEMA No. 2234.

DATA BASES USED: NAPRALERT (1988-2001), CHEMABS (1967-2001), BIOSIS (1973-2001), FSTA (1969-2001), TOXLINE (1969-2001), MEDLINE (1966-2001), PASCAL (1973-2001).
Key words: Capsicum annum L., Red pepper, chemical composition, toxicity data