preparation and syncytium formation-inhibiting drug preparation are reported (Chen *et al*., 2007). *Rhus chinensis* compounds possess strong antiviral, antibacterial, anticancer, hepatoprotective, antidiarrhoeal and antioxidant activities. Moreover, compounds isolated from this plant was also found to inhibit enamed demineralization *in vitro* and enhance remineralization of dental enamel with floride (Djakpo and Yao, 2010).

Though *Rhus chicken* is a common traditional remedy used to cure gastrointestinal diseases and as a health food, yet it was also reported harmful. Systemic contact dermatitis due to its ingestion occiasionally occurs (Yoo *et al*., 2010). Several *Rhus* species are known to induce dermatitis e.g. *Rhus succedanea* (Pellerat *et al.*, 1948), *Rhus striata* Ruiz and Pavón, *Rhus toxicodendron diversilobum* (poison oak), *Rhus toxicodendron radicans* (poison ivy), *Rhus toxicodendron vrniciflua* (urshi) and *Rhus toxicodendron* var. *vernix* (poison sumac) (Nakano *et al*., 1970). It has been early reported that the toxic part of *Rhus toxicodendron* is the resin emulsion contained in all parts of the plant and exuding upon lesion of the plant. It becomes toxic only by direct contact with the skin (Rost and Gilo, 1912). *Rhus trilobata* is among plants reported as poisonous plant problems of New Mexico. It is among the plant found to contain hydrocyanic acid, ranging from 1.0-8.1 mg% (Harshey, 1945). It is notable that poison ivy (*Rhus toxicodendron*) is eaten freely by animals but it is very toxic to humans (Fröming, 1936). There are several other reports on the poisonous species of *Rhus* (e.g. Stevens, 1907; Ford, 1908; Warren, 1910a,b; McNair, 1916; Dawson, 1956; Hurtado, 1965).

The toxic principle (1,2-dihydroxy-3-pentadecylbenzene) of poison ivy, poison oak and poison sumac, and its mode of action has been reviewed (Fesco, 1951). The toxic principle of *Rhus striata* has been shown to be a mixture of 4 compounds which possesses the carbon skeleton of 3-pentadecylcatechol and an olefinic unsaturation (Nakano *et al*., 1970).

The anti-inflammatory activity of the ethanol extract (Jung *et al*., 2011) of *Rhus verniciflua*, as well as of the compounds docasonyl caffeate (Lee *et al*., 2011a) and sulfuretin (Lee *et al*., 2010; Shin *et al*., 2010) isolated from this species has been proved.

The antioxidative activity of some *Rhus* species or their constituents (mainly phenolic compounds) have been reported e.g. *Rhus chinensis* (Fu *et al*., 1992), *Rhus javanica* (Cha *et al*., 2000), *Rhus succedanea* (Baheti *et al*., 2005), *Rhus typhina* (Zhao *et al*., 2000; Hu, 2004) and *Rhus verniciflua* (Kitts and Lim, 2001; Lim *et al*., 2001; Choi *et al*., 2002; Kim *et al*., 2010c). 1,2,3,4,6-*O*-Galloyl-β-D-glucose (isolated from *Rhus trichocarpa*) reduces renal crystallization and oxidative renal cell injury, and may be a candidate chemopreventive agent for nephrolithiasis (Lee *et al*., 2011b).

The tetrahydrosqualene, isolated from *Rhus taitensis* exhibited anti-tuberculosis activity against *Mycobacterium tuberculosis* (Noro *et al.*, 2008). The benzofuranones isolated from *Rhus chinensis* possess anti-HIV-1 activity (Gu *et al*., 2007). Moronic acid, from *Rhus javanica* possesses anti-herpes simplex virus activity. When this compound was administered orally to mice infected cutaneously with HSV-1 three times daily, it significantly retarded the development of skin lesion and/or prolonged the mean survival times of infected mice without toxicity compared with the control. Moronic acid suppressed virus yields in the brain more efficiently than in the skin. This was consistent with prolongation of mean survival times (Kurokawa *et al.*, 1999). Amentoflavone, agathisflavone and robustaflavone (biflavones isolated from *Rhus succedanea*) exhibited strong inhibitory effects against influenza A and influenza B viruses (Lin *et al.*, 1999). Also, robustaflavone has been reported as a potent inhibitor of hepatitis B virus (Zembower *et al*., 1998). *Rhus javanica* (galls) showed antifungal activity against *Trichophyton gypsum*, *Trichophyton pedis* and *Trichophyton purpurea* (Ito and Ota, 1952).

The cytotoxicity of some compounds (belonging to different classes) from *Rhus* species

has been reported *e.g.* hinokiflavone from the drupes of *Rhus succedanea* (Lin, 1989), bichalcones from the root bark of *Rhus pyroides* (Mdee *et al.*, 2003) and urushiols from the sap of lacquer tree (*Rhus vernicifera* Stokes) (Hong *et al.*, 1999). Dilute alcoholic extracts of *Rhus toxicodendron* were reported useful for prevention and treatment of tumors and genotoxicity (Heine, 2000). The gallotannin 3,6-bis-*O*-digalloyl-1,2,4-tri-*O*-galloyl- β-D-glucose, isolated from the leaves of *Rhus glabra* and *Rhus typhina* has antineoplastic activity (Islambekov *et al*., 1994). The chalcone butein (3,4,2'4'-tetrahydroxychalcone) isolated from *Rhus verniciflua* inhibits colonogenic growth of human breast cancer cells co-cultured with fibroblasts (Jang *et al*., 2005; Samoszuk *et al*., 2005). The antitumorigenic and cytotoxic properties of a copper containing protein have been reported (Kitts and Lim, 2001). The glycoprotein isolated from *Rhus verniciflua* Stokes has the capacity to modulate apoptsis, cytokine production and T/B cell proliferation in splenocytes (Lim *et al*., 2003). The glycoprotein also suppresses interleulkin-4 and -10 in bisphenol A stimulated primary cultured mouse lymphocytes (Lee and Lim, 2010). *Rhus verniciflua* has been suggested a natural agent that induces selective apoptosis and inhibits cell growth in gastric adenocarcinoma (Adwan *et al*., 2010). A case was reported in which the administration of an extract of lacquer tree (*Rhus verniciflua*) was associated with a decrease in the lung metastases in the patient with recurrent hepatocellular carcinoma after liver transplantation refractory to doxorubicin (Kim *et al*., 2010c). There are several other reports on the anticancer activity of some *Rhus* species as well as of some of their constituents. Gallic acid, isolated from *Rhus chinensis* efficiently induces apoptosis in U937 cells and is a potential chemotherapeutic agent against lymphoma (Kim *et al*., 2011a). 1,2,3,4,6- Penta-*O*-galloyl-β-D-glucose induced S-phase arrest in prostate cancer cells, in addition to induce cell death at higher levels of exposure (Park *et al*., 2010). It is also a potential drug candidate for breast cancer (Chai *et al*., 2010).

2-Hydroxy-4-methoxybenzaldehyde (from roots of *Rhus vulgaris*) was characterized as the principal tyrosamine inhibitor. It inhibited the oxidation of *i*-3,4-dihydroxyphenylalanine (Kubo and Kinst-Hori, 1999). *Rhus undulata* was among plants which inhibited rat brain monoamine oxidase (Ryu *et al.*, 1988).

5-Hydroxy-4',7-dimethoxyflavone, isolated from *Rhus undulata* roots exhibited anti-inflammatory activity. It showed a 25% inhibition of the carrageenan-induced edema in rats (Fourie and Snykers, 1984). The methanolic extract of *Rhus javanica* ripen fruits showed antidiarrhoeal effects in albino mice. It showed significant reduction in the faecal output and protected them from castor-oil induced diarrhea. The extract also reduced the intestinal fluid secretion induced by $MgSO_4$ and gastrointestinal motility after charcoal meal administration in albino mice. These results provide a support for the use of *Rhus javanica* ripen fruits as antidiarrhoeal agent in the local medicine system of Naga tribes in Manipur north east India (Tangpu and Yadav, 2004). *Rhus toxicodendron* has a slight bactericidal and a short-lasting hyperglycemic effect. When fed to dogs at levels of 2.2-4.4 mg/kg, they lower the clearance of exogenous creatinine and of *p*-aminohippuric acid, and of maximum resorption ability for glucose of the kidney ducts (Samochhowiec *et al*., 1957).

Hydroxydammarenone and semialactone (isolated from *Rhus chinensis*) may be effective in the prevention and treatment of hypercholesterolemia or artherosclerosis (Kim *et al*., 2010a). Sulfuretin and fisetin (isolated from *Rhus verniciflua* heartwood) inhibited the lipid accumulation in 3T3-L1 adipocytes (Kim *et al*., 2010d). A detoxified extract of *Rhus verniciflua* has been suggested as an ideal adjuvant in regared to regulating neuroprotection factor expression, and can contribute to neuroprotection in neurodegenerative diseases (Sapkota *et al*., 2010).

The hepatoprotective activity of *Rhus mysorensis* against CCl_4-induced hepatotoxicity

was reported (Gade *et al*., 2010). The flavonoid fraction of *Rhus verniciflua* was found to attenuate aflatoxin-B1-induced hepatic damage in mice (Choi *et al*., 2011).

Ethanolic extract of *Rhus verniciflua* showed higher α-glucosidase inhibitory effect which maked it suitable for treatment of diabetes (Kim *et al*., 2011b). Butein (3,4,2',4'-tetrahydroxychalcone) can be used for the prevention of functional β-cell damage and preventing the progression of type 1 diabetes mellitus (Jeong *et al*., 2011).

The volatile constituents in leaves of *Rhus typhina* had certain roles on the attractive and selective behaviours of two commercially important mites *Tetranychus urtica* Koch and *Tetranychus viennensis* Zacher (Li *et al*., 2009). It was found that smooth sumac (*Rhus glabra*) chemically adversely affected a number of other plants occurring close by. A portion of this allelopathic effect originated in the leaves (Stephenson, 1977).