Joshi and Magar (1952) observed that ether extract of *O. sanctum* leaves showed antibacterial activity against *E. coli* and *Staph. aureus*.

Nadkarni and Patwardhan (1952) reported that the seed of *O. sanctum* contains mucilage (hexuronic acid 27.2%, pentose 38.9%, ash 0.2%) which on hydrolysis yields xylose and an acid polysaccharide.

Bhat and Broker (1953) reported that seeds of *O. sanctum* showed anticoagulase activity as evidenced by the suppression of coagulase activity and mannitol fermentability of pathogenic Staphylococci.

Bhat and Broker (1954) further studied the action of various extracts of *O. sanctum* seed on the coagulase property of Russell viper venom and found that the seed extracts did not significantly effect the clotting of plasma by venom (at 1 hr). The clotting accelerator in *O. sanctum* seed extract was precipitated.

Gupta and Viswanathan (1955) noted the antibacterial activity of *O. sanctum* leaves against *M. tuberculosis* and *M. pyogenes var aureus*. They further revealed that the essential oil from the leaves exhibited antibacterial activity against *E. coli*, *B. anthracis*, *B. subtilis*, *Sal. pullurum*, *Sal. richmond*, *S. newport*, *S. Stanley*, *S. typhimurium*, *Staph. aureus*, *P. vulgaris* and *Pseudomonas aeruginosa*, being most active against *S. Stanley*.

Watt and Breyer (1962) noted that the leaf juice of *O. sanctum* is diaphoretic, expectorant and used in cattharal bronchitis. It also reduces earache and is used in skin diseases. Infusion of leaf is used in gastric and hepatic disorders. Juice of the fresh leaves, flower tops and the slender roots are considered to a good
antidote for snakebite and scorpion sting. Seeds are demulcent and used in genitourinary system disorders. Decoction of the root is diaphoretic and given in malarial fever, where as the fresh root stem and leaves are applied locally in cases of mosquito bite.

Dhar et al. (1968); Giri et al. (1987) and Palit et al. (1983) observed that holy basil leaves obtained from two closely related species, *O. sanctum* and *Eclipta alba* possessed similar therapeutic values and could be used for treating diabetes, arthritis, and bronchial asthma.

Singh (1969) reported that Gas liquid chromatography of essential oil of *O. sanctum* revealed the presence of eugenol 70% as a major constituent. Other components identified were nerol, eugenol methyl ether, caryophyllene, terpine-4-ol, decylaldehyde, γ-selinene, α-pinene, camphor and carvol. *O. sanctum* leaves contain 3.15% calcium and 0.34% phosphorus along with 4.97% insoluble oxalate.

Singh et al. (1972) found that crude *O. sanctum* leaf extract totally inhibited the infectivity of the Papaya Leaf Reduction Virus (PLRV). He further revealed that the inhibitory component was being most concentrated in the young leaves. The juice of *O. sanctum* showed potent antiviral activity against Top necrosis virus of pea (Roy et al. 1979).

Grover and Rao (1977) noted that the essential oil from the leaves also showed antifungal activity against *Aspergillus niger, Rizopus stolonifer* and *Penicillium digitatum*. The oil and also eugenol and methyl eugenol showed activity against *Alternaria solani, Candida gullermandii, Colletotrichum capsici, Curvularia spp, Fusarium solani* and *Helmenthosporium oryzae*, eugenol being most active.

Rajendran and Gopalan. (1978) noted that the petroleum ether extract of stem and leaves of *Ocimum sanctum* showed juvenomimetic activity on the 5th instars nymph of *Dysdercus cingulatus*. 
Lal et al. (1979) and Nair et al. (1982) reported the presence of urosolic acid, apigenin, letolin, apigenin - 7 - 0 - glucoronide, nolludistin, and orientinein in O. sactum leaves.

Rajendran and Gopalan (1979) reported that the acetone extract of O. sanctum contained insecticidal activity against Spodoptera litura. Water extract of plant showed promising nematicidal activity against the plant parasites nematode Meloidogyne incognita (Vijayalakshmi et al. 1979).

Bhargava et al. (1981) and Mandal et al. (1993) studied and demonstrated that sacred basil improved resistance to different type of stress. Increased resistance has been demonstrated in animal model against stressors factor i.e. behavioral despair, induced gastric ulcers, and exposures of hepatotoxin.

Seth et al. (1981) studied the benzene extract of leaves in 100, 150, 250 mg/kg altered the weight of testis in male rats, without having significant effect on epididymis, seminal vesicle, prostrate and vasdeference and Significant reduction in sperm count and motility.

Nair et al. (1982) reported the presence of urosolic acid, apigenin, letolin, apigenin - 7 - 0 - glucoronide, nolludistin, and orientinein in O. sactum leaves.

Kishore et al. (1982) reported that the ethenolic extract of the leaves showed fungi toxic activity against Rhizoctonia solani. The antimicrobial and antifungal action of O. sanctum leaves was also studied by Sen. et al.(1983) who assessed them active against most of the organisms tested, particularly, Curvularialunata, Rhizopus nigricans, Fusarium oxysporum, Klebsiella pneumoniae, Sachromyces cerevisiae and Candida torulopsis.

Tripathi and Tripathi (1982) reported that the extract reduced the infectivity of bean common mosaic virus although it was less effective than the neem leaf extract.
Singh et al. (1983). The essential oil from *O. sanctum* also exhibited antifungal activity against dermatophytes viz., *Eperdermophyton floceosum*, *Trichophyton mentagrophytes* and *Microsporum canis*.

Dey and Chauodhri (1984) reported that the essential oil from different parts of *O. sanctum* varied in percentage and found highest percentage of oil in leaves followed by inflorence and stem but root was devoid of essential oil.

Godhwani et al. (1987) found that leaf extract of basil inhibited both acute and chronic inflammation, and had analgesic and antipyretic effect. All of this effect may be attributed to the inhibition of prostaglandin biosynthesis.

Godhwani et al. (1988) *O. sanctum* (Sanskrit: Tulasi; English: holy basil; Family: Labiaceae). It is found throughout tropical and subtropical regions of India and other Asian countries. It is a branched, fragrant and erect herb. It attains height of about 75 to 90 cms when matures. Leaves are nearly round and up to 5 cms long with margin, i.e. entire or toothed. Flowers are small having purple to reddish colour, present in small compact cluster or cylindrical spike. The fruits are small and yellow to reddish in colour. Different parts of the plant are traditionally utilized in the Ayurveda and Siddha systems for treatment of several ailments like infection, skin disease, hepatic disorder, common cold and cough, malarial fever and as an antidote for snake bite and scorpion sting.

Shah and Qudry (1988) reported that *O. sanctum* leaves contain 0.7 % volatile oil comprising of 71 % eugenol and 20 % methyl eugenol. The oil also contained carbadol and sesqiterpine hydrocarbon caryophyllene.

Mediratta et al. (1988) reported that *O. sanctum* modulates the humoral immune responses by acting at various levels in the immune mechanisms such as antibody production, release of mediators of hypersensitivity reactions, and tissue responses to these mediators on the target organs.

Sakina et al. (1990) assessed that leaf extract of basil produces similar effect as produced by low doses of barbiturates in pharmacological studies, but same time produced some effects reminiscent of ampiritamines.
Balanehru and Nagarajan (1991) observed that urosolic acid extracted from basil protected against lipid peroxidation in liver microsome in vitro.

Aruna and Shivramakrishnan (1992) observed that *O. sanctum* significantly decreased the incidence of benzopyrene induced neoplasia and 3'MeDAB induced hepatomas.

Aruna and Shivramakrishnan (1992) reported that *O. sanctum* leaves suppressed benzo (a) pyrine induced chromosomal aberrations in bone marrow and elevated glutathione (GSH) and glutathione –s-transferase (GST) activity in liver of mice and suggested possible role of plant in protecting against the cancer.

Kanta and Gogate (1992) studied the effect of feeding Tulsi leaves along with normal diet on the reproductive behavior of adult wistar rats, experimental animals were given Tulsi extract in graded doses of 100 mg/kg, 150 mg/kg, 200 mg/kg and 400 mg/kg along with normal diet while control group was on only similar normal diet. Each dose was given for 15 days and reproductive behavior was monitored in term of score, when Tulsi dose was increased to 200 mg/kg to 400 mg/kg. Benzene extract of leaves in 100, 150, 250 mg/kg altered the weight of testis in male rats, without having significant effect on, epeledymis, seminal vesicle, prostrate and vasdefereference. A significant reduction in sperm count and motility was observed (Seth et al.1981).

Norr and Wanger (1992) reported that vicenin - 2, gletolin, cirsilionol eugenyl - β - D glucosides, and 4- allyl -1 - 0 - β - D-glucopyranosil- 2- hydroxy benzene. The fixed oil contain five fatty acid viz. palmitic (11.69%), stearic (3.19%), oleic (13.82%), linoleic (52.23%) and linolenic (16.63%).

Kantak and Gogate (1992) studied the effect of feeding tulsi leaves along with normal diet on the reproductive behavior of adult wistar rats; experimental animals were given tulsi extract in graded doses of 100 mg/kg, 150 mg/kg, 200 mg/kg and 400 mg/kg along with normal diet while control group was on only similar normal diet. Each dose was given for 15 days and reproductive behavior
was monitored in term of score, when tulsi dose was increased to 200 mg/kg to 400 mg/kg. The benzene extract of leaves in 100, 150, 250 mg/kg altered the weight of testis in male rats, with out having significant effect on, ededemys, seminal vesicle, prostrate and vasdeference.

Chattophadaya (1999) noted that oral administration of alcoholic extract of *O. sanctum* caused lowering of blood sugar level in normal glucose fed hyperglycemic and induced diabetic rats.

Mandal *et al.* (1993) observed antiulcerogenic property of *O. sanctum* in pyloric ligated and pyloric ligated aspirin treated rats. The extract reduced the ulcer index, free and total acidity on acute and chronic administration. Seven days pre treatment with drug increased the mucous treatment also. It may be concluded that *O. sanctum* extract has antiulcerogenic property against experimental ulcer, and it is due to ability to reduce acid secretion and increase mucous secretion.

Sarkar *et al.* (1994) studied that administration of fresh leaves of *O. sanctum* at the rate of 1- 2 gm in 100 gm of diet, given for four weeks, brought about significant change in lipid profile of normal albino rat. This resulted in significant lowering in phospholipids and LDL cholesterol level and significant increase in the HDL cholesterol and total faecal sterol content.

Prasher *et al.* (1994) observed that ethanolic extract of leaf of *O. sanctum* showed inhibitory effect on the chemically induced skin papillomas in mouse.

Warrier (1995) Stated that there are two main morphotypes cultivated in India-green-leaved (Sri or Lakshmi Tulsi) and purple-leaved (Krishna Tulsi).Basil contains a volatile oil consisting of about 70% eugenol as well as methyl eugenol and caryophyllene (*Agarwal et al.*, 1996).

Devi and Ganasoundari (1995) studied that water extract of leaf of *O. sanctum* was more effective and less toxic, as compared to aqueous extract, in improving the survival effect in mice, when administered intra peritoneally before a whole body exposure to 11Gy of 60 Co gamma radiation. The intra peritoneal route gave the best protection in respect to intra muscular, intra venous or oral route.
Singh et al. (1996) reported that the fixed oil of *O. sanctum* (Labiatae) was found to possess significant anti-inflammatory activity against carrageenan and different other mediator-induced paw edema in rats.

Shyamala and Devaki (1996) demonstrated protective effects against copper sulphate toxicity in rats. Copper sulphate caused the development of hydroxyl free radicals and subsequent increased lipid peroxidation and led to cause rise in levels of antioxidant enzymes such as superoxide dismutase and catalase. Administration of sacred basil restored the various parameters to near normal values.

Uma and Ganasoundari et al. (1999) studied the aberration in the bone marrow of mice exposed to a range of sub lethal whole body gamma doses. They revealed that extract significantly reduced the percent aberrant metaphases as well as different aberrations, including dicentric and rings, induced by radiation dose of 3-5Gy.

Kumar et al. (1997) found ethanolic extract of *O. sanctum* act better antiviral agent than *Azadirachta indica* extract, against the F1 strain of New Castle disease virus.

Rai et al. (1997) reported that Tulsi leaf powder was fed at 1% level in normal and diabetic rats for a period of one month shown hypoglycemic and hypolipidemic effect in diabetic rats.

The seed of basil contains fixed oil, containing five fatty acids, including about 17% linonic and just one 50% linoleic acid (Singh et al. 1997).

Rani (1997) reported the decrease in serum total cholesterol with the supplementation of Tulsi and nicotinic acid in boilers.

Other constituent with similar pharmacological activity includes the triterpenoid, urosolic acid, rosemaranic acid, alkaloid saponine, flavonoids, phenypropane glucosides and tannins (Devi. et al., 1998).
Sembulingam et al. (1997) noted that rat prevented elevation of plasma corticosterone level induced by loud noise treated with scared basil extract.

Singh and Majumdar (1999) reported that the fixed oil contain five fatty acid viz. palmitic (11.69%), stearic (3.19%), oleic (13.82%), linoleic (52.23%) and linolenic (16.63%).

Singh (1998) reported that the seed of basil contains fixed oil, containing five fatty acids, including about 17% linonic and just one 50% linoleic acid.

Ganasoundari et al. (1998) reported that administration of *O. sanctum* extract with WR-2721 before irradiation considerably enhanced the chromosome protection and also delayed the chromosome toxicity caused by WR-2721.

Pfeffer et al. (1998) observed Interferons as antiviral agents in the year 1957 by Issacs and Lindemann. Interferons are classified according to cellular origin and the type of receptors they as type I since they bind to interferon cell surface receptors type 1, although they have different binding affinities, they have similar biological effects.

Sharma et al. (1998) found that leaves of *O. sanctum* delayed the onset as well as maturation of cataract significantly in 2 model of cataract i.e. galactosomic cataract in rats and naphthalene cataract in rabbit. The effect of *O. sanctum* (70, 140, 280, and 560 micro gm/ml) was studied on the levels of reduced glutathione (GSH) and thiobarbituric acid reacting substances (TBARS) in selenite-challenged lenses. The lowest concentration of *O. sanctum* offering significant modulation on these two parameters was determined. Subsequently, the effect of prior and co treatment with the lowest effective concentration of *O. sanctum* was studied on TBARS, GSH, and on lens antioxidant enzymes such as super oxide dismutase (SOD), glutathione peroxidase (GSHPx), catalase (CAT), and glutathione-S-transferase (GST) Changes (Gupta et al.2005).

Panda et al. (1998) reported that he effects of Ocimum sanctum leaf extract on the changes in the concentrations of serum T3, T4 were investigated in the male mouse.
Shan et al. (1999) studied the Chinese herbal medicine *Astragalus membranacu*, in an in vitro human model and showed to lower IL6.

Prasher et al. (1998) reported that extract of *O. sanctum* prevent the adduct formation between the carcinogen and DNA.

Karthikeyan et al. (1999) showed inhibitory effect of *Ocimum* leaves preparation on the induction of papilloma and carcinoma in the buccal pouch of hamster.

Singh and mazumdar (1999) reported that the fixed oil of *O. sanctum* was found to posses significant anti-ulcer activity against aspirin, indomethacin, alcohol, histamine, reserpine, serotonin and stress induced ulceration in experimental animal models.

Karthikeyan et al. (1999) reported that *O. sanctum* plant extract has been shown to protect against chemically induced oral cancer and the development of skin papillomas in rodents.

Archana and Namasivayam (2000) revealed that sacred basil treatment prevented several noise-induced responses in rats namely an inverse in plasma corticosteron level, leucopenia and enhanced neutrophilic function.

Kelm et al. (2000) reported that six phenolic compounds eugenol, rosmarinic acid, apigenin and three other flavonoids isolated from basil showed good and excellent antioxidant activity in vitro.

Prakash and Gupta (2000) concluded that anti oxidant activity of sacred basil seed oil deemed to be partly responsible for the chemopreventive effect.

Asha et al. (2001) reported that the essential oil of *O. sanctum* showed potent anthelmintic activity in the Caenorhabditis elegans model. Eugenol exhibited an ED$_{50}$ of 62.1 µg/ml. Eugenol being the predominant component of the essential oil, is suggested as the putative anthelmintic principle.

Singh et al. (2001) reported that *Ocimum sanctum* fixed oil produced hypotensive effect in anaesthetized dog, which seems to be due to its peripheral
vasodilatory action. The oil increased blood-clotting time and percentage increase was comparable to aspirin and could be due to inhibition of platelet aggregation.

_Vrinda and Devi (2001)_ studied two part Orientin (Ot) and Vicenin (Vc) water-soluble flavonoids isolated from the leaves of _O. sanctum_ have shown significant protection against radiation lethality and chromosomal aberrations in vivo. In the present study the protective effect of Orientin and Vicinine against radiation induced chromosome damage in cultured human peripheral lymphocytes was determined by micronucleus.

_Ahmed et al. (2002)_ assessed reversible antifertility effect of benzene extract of _O. sanctum_ leaves on sperm parameters and fructose content in semen in rats and found that the percentage of abnormal sperm increased in caudal epididymal fluid, and the fructose content decreased in the caudal plasma of the epeledymis and the seminal vesicles. The results suggested that such effect was due to androgen deprivation, caused by the anti-androgenic property of _O. sanctum_ leaves. The effect was reversible because all parameters returned to normal 2 wk after the withdrawal of treatment.

_Ahmed et al. (2002)_ reported that treatment of Albino rats with a Benzene extract of _Ocimum sanctum_ leaves for 48 days decreased total sperm count, sperm motility, and forward velocity.

_Li-Weber et al. (2002)_ observed that Sesquiterpenes lactones, bioactive molecules present in different medicinal plants, have been described for their anti-inflammatory activity by suppressing IL-4 gene expression in peripheral blood in a dose-dependent manner and by blocking NF-kB binding to 2 important IL-4 promoter regulatory elements.

_Seeharam (2003)_ reported presence of eugenol, phenols such as carvacol and eugenol; non phenolic such as methyl eugenol, methyl chavicol caryophyllene etc. The flavonoids include apiginene, leutioline, vicenine-2, orentine, isoorientine, vitexin iso vetexin crisilineol, isothymusin rosmaranic acid chaffier acid. _O. sanctum_ plants grown in Cuba, Brazil, India, Germany and Thailand
contain eugenol as main constituent (345, 17-795, 53%, 24%, 55%) respectively. Frequently, together, a significant amount of \( \beta \)-caryophyllene or \( \alpha \) and \( \beta \)-bisabolenes. Methyl eugenol was the main constituent of the same oil of \( O. sanctum \) from India.

**Jaggi et al. (2003)** studied the anticonvulsant effect of \( O. sanctum \) and found that ethanol and chloroform extracts of leaves and stem were effective in preventing tonic convulsions induced by trans corneal electroshock.

**Khanna and Bhatia (2003)** reported the alcoholic leaf extract of \( Ocimum sanctum \) (OS, Tulsi) was tested for analgesic activity in mice. In the glacial acetic acid (GAA)-induced writhing test, OS (50, 100 mg/kg, i.p.; and 50, 100, 200 mg/kg, p.o.) reduced the number of writhes. OS (50, 100 mg/kg, i.p.) also increased the tail withdrawal latency in mice. Naloxone (1 mg/kg, i.p.), an opioid antagonist, and DSP-4 (50 mg/kg, i.p.), a central noradrenaline depletor, attenuated the analgesic effect of OS in both the experimental models, whereas, PCPA (300 mg/kg, i.p.), a serotonin synthesis inhibitor, potentiated the action of OS on tail flick response in mice. The results of this study suggest that the analgesic action of OS is exerted both centrally as well as peripherally and involves an interplay between various neurotransmitter systems.

**Khanna and Bhatia (2003)** reported that the whole plant is used in treatment of glossitis, ulcers, maggots in wounds, anthrax, pneumonia, tympanitis, pain in abdomen, constipation, stoppage of urination, liver fuke, loss of appetite, stomach pain, dog bite, cold and cough, cannabis poisoning, opacity of cornea, swelling of lungs, tachycardia, sprains and sore eyes. The leaves are used in treatment of bleeding, cough and cold, eye diseases, udder infection and wound healing in ruminants.

**Halder et al. (2003)** reported that Ocimum \( sanctum \) offered maximum aldose reductase inhibiting activity followed by \( Curcuma longa \), \( Azadirachta indica \) and \( Withania somnifera \).
Shin et al. (2003) found the administration of PG201 (formulation of 12 herbs) significantly suppressed the progression of collagen induced arthritis and inhibit the production of TNF-α and IL-1β in the paws.

Geetha and Vasudevan (2004) O. sanctum has significant ability to scavenge highly reactive free radicals. Shade dried leaf powder of the plant was extracted with water and alcohol, and then fractionated with different solvents. Both aqueous and alcoholic extracts and their fractions have in vitro anti-lipid peroxidative activity at very low concentrations. In vivo, hypercholesterolemia-induced erythrocyte lipid peroxidation activity was inhibited by aqueous extracts of Ocimum in a dose dependent manner in male albino rabbits. Aqueous extract feeding also provided significant liver and aortic tissue protection from hypercholesterolemia induced peroxidative damage.

Gholap and Kar (2004) reported that three plants viz. O. sanctum, I racemosa and B. diffusa exhibit antiperoxidative, hypoglycaemic and cortisol lowering activities. They also suggested that these three plant extracts may potentially regulate corticosteroid induced diabetes mellitus.

Dharmani et al. (2004) also observed anti-ulcer ability of O. sanctum which was due to its cytoprotective effect rather than anti secretory activity. Conclusively O. sanctum was found to possess potent anti-ulcerogenic as well as ulcer healing properties and could act as potent therapeutic agent against peptic ulcer diseases.

Rani and khullar (2004) screened some medicinal plants including O. sanctum for their activity against multi drug resistant Salmonella typhi and found moderate antimicrobial property for O. sanctum.

Yanpallewar et al. (2004) evaluated the antioxidant and neuroprotective effect of O. sanctum on transient cerebral ischemia and long term cerebral hypoperfusion caused by implication of free radicals.
Funde (2005) reported the significant increase in the body weighty gain with the supplementation of Ocimum sanctum leaves.

Goel et al. (2005) observed ulcer protecting effect of O. sanctum and found that optimal effective dose (100 mg/kg) of O. sanctum extract showed significant ulcer protection against ethanol and pyloric ligation-induced gastric ulcers, but was ineffective against aspirin-induced ulcers. O. sanctum extracts significantly healed ulcers induced by 50% acetic acid after 5 and 10 days treatment. O. sanctum extract (100 mg/kg) significantly inhibit the offensive acid/pepsin secretion and lipid peroxidation and increased the gastric defensive factors like mucine secretion, cellular mucus, and life span of mucosal cells and had antioxidant effect, but did not induce mucosal cell proliferation. The results indicated that the ulcer protective and healing effects of O. sanctum extract may be due to its effects both on offensive and defensive mucosal factors.

Gupta et al. (2005) reported the effect of O. sanctum (70, 140, 280, and 560 micro gm/ml) was studied on the levels of reduced glutathione (GSH) and thiobarbituric acid reacting substances (TBARS) in selenite-challenged lenses. The lowest concentration of O. sanctum offering significant modulation on these two parameters was determined. Subsequently, the effect of prior and co treatment with the lowest effective concentration of O. sanctum was studied on TBARS, GSH, and on lens antioxidant enzymes such as super oxide dismutase (SOD), glutathione peroxidase (GSHPx), catalase (CAT), and glutathione-S-transferase (GST) Changes.

Kaul et al. (2005) reported that the O. sanctum has also been used as an ingredient of herbal preparations with other medicinal plants.

Kicel et al. (2005) reported that the different component of Ocimum sanctum and found different concentrations of eugenol, luteolin, ursolic acid, and oleanolic acid, respectively. Instrumental relative standard deviation (RSD) values were 0.24, 0.39, 0.21, and 0.18% for eugenol, luteolin, ursolic acid and oleanolic acid respectively. Eugenol content ranged from 0.175 to 0.362% (w/w) and luteolin
from 0.019 to 0.046% (w/w) in the samples analyzed. Different preparations (dried leaf powder, methanolic, acetonic and petroleum ether extracts) obtained from leaves of *Ocimum sanctum* on the basis of Gas chromatography and mass spectrophotometry (GC-MS) revealed the presence of varying number of components in varying percentage. In dried leaf powder 49 components were found, major components were 1-Methyl eugenol (89.20%), 2-Eugenol (5.29%), in methanolic extract 1-Stigmast-5-en-3-ol (17.46%), 2-Stigmast-5, 22-dien-3-ol (13.13%), 3-Methyl eugenol (6.19%) were found in majority, in Acetonic extract 1- Methyl eugenol (25.31%), 2-Neophytadiene (7.77%) was found in majority, in Petroleum ether extract 1- Methyl eugenol (20.97%), 2-Octadecane (17.50%), 3-β-caryophylene (8.22%) were found in majority (DST Project report 2006).

Mukherjee et al. (2005) observed the effects of *O. sanctum* on different parameters in bovine mastitis such as somatic cell count (SCC), total bacterial count (TBC), milk differential leukocyte count (DLC), phagocytic activity and Phagocytic index and leukocyte lysosomal enzymes like myeloperoxidase and acid phosphates after intramammary infusion of aqueous leaves extract. The results revealed that the aqueous extract of *O. sanctum* treatment reduced the TBC and increased neutrophils and lymphocyte counts with enhanced phagocytic activity and phagocytic index. Similarly, the lysosomal enzymes contents of the milk poly morpho nuclear cells (PMNs) were also enhanced significantly in animals treated with the extract. The results suggested that crude aqueous extract of *O. sanctum* (leaf) possessed some biologically antibacterial and immunomodulatory active principles.

Nanasombat and Lohasuphyawee (2005) noted antibacterial activity of crude ethanolic extracts and essential oils of spices against salmonellae and other enterobactria using disc diffusion method, and found inhibitory activity of spice oils was greater than that of their own ethanolic extracts.

Prakash and Gupta (2005) *O. found that sanctum* extract have been used for various alignments including bronchitis, diarrhea, skin infections, painful eye
infections and are known to possess hepato-protective, cardio-protective anti-diabetic and anticancer activity.

Ravindran et al. (2005) observed effect of *O. sanctum* on stress and found that administration of the 70% ethanolic extract of *O. sanctum* had a normalizing action on discrete regions of brain and controlled the alteration in neurotransmitter levels due to noise stress, emphasizing the antistressor potential of this plant.

Salmah et al. (2005) reported wound healing activity of *Ocimum basilicum* on cutaneous excised wounds in rats.

Singh et al. (2005) reported that *Ocimum sanctum* fixed oil showed good antibacterial activity against *Staphylococcus aureus, Bacillus pumilus* and *Pseudomonas aeruginosa*.

Shokeen et al. (2005) studied the antibacterial effect of *O. sanctum* against the *Nesseria gonorrhea*.

Subramanian et al. (2005) studied antioxidant activity of two polysaccharides isolated from the *O. sanctum*, which could prevent the oxidative damage to liposomal lipids and plasmid DNA induced by various oxidants.

Subramanian et al. (2005) showed that *O. sanctum* polysaccharide (OSP) could prevent oxidative damage to liposome lipids and plasmid DNA induced by various oxidants such as iron, AAPH and gamma radiation, the superoxide radical and hydrogen peroxide and inhibiting xanthine oxidase. In addition, OSP could prevent gamma radiation mediated cell deaths in mouse splenocytes.

Anandjiwala et al. (2006) studied the different component of *Ocimum sanctum* and found different concentrations of eugenol, luteolin, ursolic acid, and oleanolic acid, respectively. Instrumental relative standard deviation (RSD) values were 0.24, 0.39, 0.21, and 0.18% for eugenol, luteolin, ursolic acid and oleanolic acid respectively. Eugenol content ranged from 0.175 to 0.362% (w/w) and luteolin from 0.019 to 0.046% (w/w) in the samples analyzed.
**Bhartiya et al. (2006)** assessed radio protective effect of aqueous extract of *O. sanctum* (40 mg/kg body weight, for 15 days) in mice exposed to high doses (3.7 MBq) of oral 131 iodine by studying the organ weights, lipid peroxidation and antioxidant defense enzymes in various target organs like liver, kidneys, salivary glands and stomach at 24 hr after exposure in adult Swiss mice. The mean weight of the salivary glands showed significant increase after 131 iodine administration. 131 iodine exposure significantly increased lipid peroxidation in kidneys and salivary glands in comparison to control animals. Pretreatment with *O. sanctum* in radioiodine exposed group showed significant reduction in lipid peroxidation in both kidneys and salivary glands. In liver, glutathione (GSH) levels showed significant reduction after radioiodine exposure while pretreatment with *O. sanctum* exhibited less depletion in glutathione (GSH) level even after 131iodine exposure. However, no such changes were observed in stomach. The results indicate the possibility of using aqueous extract of *O. sanctum* for ameliorating 131 iodine induced damage to the salivary glands.

**DST Project report (2006).** Stated that different preparations (dried leaf powder, methanolic, acetonic and petroleum ether extracts) obtained from leaves of *O. sanctum* on the basis of Gas chromatography and mass spectrophotometry (GC-MS) revealed the presence of varying number of components in varying percentage. In dried leaf powder 49 components were found, major components were 1-Methyl eugenol (89.20%), 2-Eugenol (5.29%), in methanolic extract 1-Stigmast-5-en-3-ol (17.46%), 2-Stigmast-5, 22-dien-3-ol (13.13%), 3-Methyl eugenol (6.19%) were found in majority, in Acetonic extract 1- Methyl eugenol (25.31%), 2-Neophytadiene (7.77%) was found in majority, in Petroleum ether extract 1- Methyl eugenol (20.97%), 2-Octadecane (17.50%), 3-β-caryophyllene (8.22%) were found in majority

**Gupta et al. (2006)** reported that two weeks treatment of diabetic rabbits with *Ocimum sanctum* Linn. Seed oil showed no significant hypoglycaemic effect. Results showed that OSSO has hypocholesterolaemic and antioxidant effects but it didn't have anti-diabetic effect.
Goel et al. (2006) studied antimicrobial activity of *Ocimum sanctum* was investigated against three bacterial isolates viz. *Staphylococcus aureus*, *Escherichia coli* (O26), and *Salmonella* Typhimurium and found effective by disc diffusion method.

Hannan et al. (2006) investigated the effect of O. sanctum leaf extract stimulation on insulin secretion from perfused pancreas, isolated islets and clonal pancreatic B cells. Findings indicated that constituents of *O. sanctum* leaves extracts have stimulatory effect on physiological pathways of insulin secretion which may underlie its reported antidiabetic action.

Joshi and Parle (2006) reported that compared to control, scopolamine and aged groups of mice, *Ocimum sanctum* whole plant extract decreased transfer latency and increased step down latency significantly

Lee et al. (2006) evaluated therapeutic potential of twenty-two medicinal herb species traditionally used in Korea to treat gastrointestinal infections and concluded that *Schizandrae fructus* had the potential to provide an effective treatment for salmonellosis.

Niture et al. (2006) investigated alterations in methyl treansferase (MGMT) activity and expression in human peripheral blood lymphocytes and cancer cell lines induced by water-soluble and alcohol-soluble constituents several plants with established antioxidant and medicinal properties. Both the ethanolic and aqueous extracts from neem (*Azadirachta indica*), holy basil (*Ocimum sanctum*), winter cherry (*Withania somnifera*), and oregano (*Origanum majorana*) increased the levels of MGMT protein and its demethylation activity in a time-dependent manner with a maximum of 3 fold increase after 72 hours treatment. The extracts from gooseberry (*Emblica officinalis*), common basil (*Ocimum basilicum*), and spearmint (*Mentha viridis*) were relatively less efficient in raising treansferase methyl treansferase (MGMT) levels.

Sood et al. (2006) reported that hydro alcoholic extract of *Ocimum sanctum* protect the rats from chronic restraints stress induced changes in the
myocardium. The reduction in corticosterone level caused by chronic exposure to noise stress was prevented by the treatment of animals with *Ocimum sanctum* extract.

**Shetty et al. (2006)** reported that aqueous extract of *Ocimum sanctum* Linn. Possessed significant wound healing and antioxidant activities, which may be useful in the management of abnormal healing such as keloids and hypertrophic scars.

**Shetty et al. (2006)** studied wound healing effect of *O. sanctum* on granulation tissue breaking strength, granulation tissue dry weight, hydroxyproline level in dry granulation tissue, superoxide dismutase (SOD) and catalase levels in wet granulation tissue. Increased wound breaking strength, decreased epithelization period, increased percent wound contraction, increased granulation tissue weight and hydroxyproline concentrations were observed. The increased activity of antioxidant enzymes such as superoxide dismutase (SOD), catalase level in extract treated group compared to controls. Granulation tissue was subjected to histopathological examination to determine the pattern of lay/down for collagen using Haematoxylin and Eosin stains which confirmed the results. Owing to wound healing and antioxidant activities, *O. sanctum* may be useful in the management of abnormal healing such as keloids and hypertrophic scars.

**Trevisan et al. (2006)** studied the antioxidant activity of *Ocimum* spp. and found that essential oils obtained from various herbs and spices may have an important role to play in cancer chemoprevention, functional foods, and in the preservation of pharmacologic products.

**Udupa et al. (2006)** reported inhibition of negative effect of dexamethasone in the wounds by the use of extract of *O. sanctum*. Extract of *O. sanctum* significantly increased the wound breaking strength in an incision wound in rat model. The extract treated wound found to epithelize faster and then rate of wound contraction was significantly increased as compare to control wounds. A significant increase in dry and wet granulation tissue weight, granulation tissue
breaking strength and hydroxyl proline content in dead space in the wound is observed.

Ahmed et al. (2007) described for the first time the differential immune response to virulent Newcastle disease virus (NDV) in birds, as measured by response to phytohaemagglutinin-P. Study provided baseline data on the effect of phytohaemagglutinin-P response-based selection on immune responses to virulent NDV and the data could be of immense importance to poultry geneticist and immunologist attempting to breed poultry for disease resistance.

Samjon et al. (2007) administered ethanolic extract of Ocimum sanctum and showed that it attenuates the alterations induced by noise exposure.

Shetty et al. (2007) evaluated wound healing potential of O. sanctum, using incision, excision and dead space wounds in extract-treated rats and controls. Both alcoholic and aqueous extract significantly increased wound breaking strength, hydroxyproline, hexuronic acid, hexosamines, superoxide dismutase, catalase, reduced glutathione and significantly decreased percentage of wound contraction and lipid peroxidation when compared with the control group. The results suggested antioxidant properties of O. sanctum.