

Chapter ii



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CHAPTER II REVIEW OF RELATED LITERATURE Related Readings Republic Act No. 973 is an act appropriating the sum of two million pesos for the control and eradication of rats and other agricultural pests and diseases. Section 1 says that the sum of two million pesos or so much thereof as may be necessary is hereby appropriated, out of any funds in the National Treasury not otherwise appropriated, to be expended by the Department of Agriculture and Natural Resources for the purchase of materials and payment of labor that may be employed in the control and eradication of rats and other agricultural pests and diseases. Virginia Attorney General Ken Cuccinelli says he is worried that a new District of Columbia law that governs how pest control operators must handle rats may result in entire rodent "families" being relocated across the Potomac River into Virginia by D. C. pest control personnel. Lately, there have been reports of growing rat infestations around the Occupy DC protests at Freedom Plaza and McPherson Square. Cuccinelli said D. C.'s new rat law--the Wildlife Protection Act of 2010 (Wildlife Protection Act of 2010. pdf) --is "crazier than fiction" because it requires that rats and other vermin not be killed but captured, preferably in families; no glue or snap traps can be utilized; the rodents must be relocated from where they are captured; and some of these animals may need to be transferred to a "wildlife rehabilitator" as part of their relocation process.

Related Literature The Sugar Apple (*Annona squamosa*) is a small deciduous tree that only reaches a height in Florida of about 20 to 25 feet. Native to Central America this grows best in warm frost free areas. The leaves are alternate, 6-8 inches long and thin, and the tree loses those leaves shortly after Christmas and is bare for about four to six weeks. Flowers appear with the leaves in the spring and the fruit ripens starting in mid to late summer

through late fall. Fruits are anywhere from 3 to 5 inches in diameter with a lumpy green skin and upon maturity the fruit has a bluish or white blush. Some varieties are developed that have a red blush or red skin which are much more attractive. At maturity fruits have custard like white pulp with small black seeds and the sweet flesh is eaten fresh or used for milkshakes and ice creams. During wet summers often maturing fruit tends to split and this can be prevented by picking the fruits just prior to full maturity and ripening them off the tree. Trees are easily started from seed and it takes one to two years for seedlings to start producing flowers. Many superior varieties are available and these are sold through nurseries as grafted or budded plants. Trees have few problems other than cold weather, but the fruit is attacked by *Annona* seed borer and occasionally caterpillars might chew foliage. Fruits, once mature, can be cleaned and the pulp frozen for many months for future use. If close to salt water, protect sugar apples from direct ocean spray since this may cause burning of the thin leaves. Some varieties to look for include Island Gem, Lincoln, Cuban; Brazilian and Purple. Sugar apples make great container plants, too. Trees in the landscape should be fertilized every three to four months with a citrus or palm type fertilizer containing good levels of micro-nutrients. In highly alkaline soil deficiencies may develop that require nutritional sprays to correct. (Gene Joyner, Extension Agent I, IFAS Palm Beach County Cooperative Extension Service)

Sugar apple is native to the tropical and subtropical parts of Latin America and the West Indies, most of which are in the low altitude areas. The fruit was introduced to Taiwan by Dutch colonialists about 400 years ago. Sugar apple goes by various names, including Buddha's head and custard apple. In Taiwan, it has been called the foreign lychee or Sakya. The name of foreign

lychee comes from the fact that the unripe fruits look like lychee and it was from a foreign country. As for its second Taiwanese name - which is more commonly used nowadays, people call it Sakya or Buddha's head, because one variety resembles the top part of Sakyamuni's head. Although the fruit is not native to Taiwan, Taiwan has become the largest sugar apple cultivating country in the world. Sugar apple are grown in southern Taiwan in Kaohsiung, Pingtung and Taitung counties. Among them, Taitung is the largest production area in Taiwan. In Taiwan, the fruit can be harvested from July to February. There are 10 major types of sugar apple currently grown in Taitung . Among them, TamaliDamu sugar-apple and Beinan pineapple sugar-apple are the two most popular varieties. Sugar apple is high in protein and carbohydrates and rich in calcium, vitamin C, phosphorus, potassium and magnesium. The fruit is also high in calories; one sugar apple is equal to half a serving of white rice, which contains about 141 calories. Therefore, eating the fruit as a dessert is a healthy way to feel full without actually eating too big of a meal. Pink-Eyed Whites, like Frosty, have a long history in the rat fancy. The Albino rat (officially known as the Pink-Eyed White or PEW) is most likely the very first mutation to be discovered and purposely bred. Albinism is a very common mutation even in wild populations, showing up in many animals including dogs, horses, ferrets, rabbits, cavies, and many others including rats and mice. Naturally, the white coats and pink eyes of these animals would make it very difficult for them to survive in the wild. Discovered by someone with an interest in animals, however, an oddly colored white rat might well have been captured rather than killed. Mary Douglas (the mother of the rat fancy) once stated that Albino rats were introduced to great Britain by a traveling entertainer

around the year 1800. In Victorian times, wild rats were caught in huge numbers for the "rat pits" that were popular at the time. Between the 1840s and 1860s some of these rats were kept, bred, and sold as pets. Pink-Eyed Whites were among them. In 1908 Beatrix Potter published her book "Samuel Whiskers" (a story about a wild rat and his wife). She dedicated it to the Albino rat which was a favorite pet when she was a child. Pink-Eyed Whites were among the first of the colors to be bred specifically for exhibition purposes. Their description was in the National Mouse Club standards when they first included classes for rats in 1901. They were included in the National Fancy Rat Society standards when that club was founded in 1976, and in the AFRMA standards in 1983. The first PEW rat to be shown at an AFRMA show was Snowy owned by Nancy Ferris. Frosty owned and bred by Nancy Ferris was the first PEW to win Best In Show, and of course Frosty holds the record for the most Best In Show awards won by any rat of any color at AFRMA shows (Nichole Royer). Maturation of the excitatory and inhibitory neuromechanisms at various levels of the central nervous system was demonstrated by the convulsogenic activity induced by leptazol in the developing albino rat. The somatomotor end points considered (myoclonic jerk, myoclonic seizure, tonic seizure and catalepsy) were not observed in all age groups. Tonic seizure was seen at birth, myoclonic jerks at 2 weeks of age, myoclonic seizure and catalepsy at 3 weeks of age. The convulsive sequences described presented three different patterns, defining three age groups: the infant pattern (infant group: newborn-1 week old animals); the transitional pattern (transitional group: 2 week old animals); and the adult pattern (adult group: 3 week old-adult animals). Effective doses were determined for the three types of convulsive

sequence: MJ50 for the myoclonic major sequence (maximal end point: myoclonic jerk), MS50 for the myoclonic major sequence (maximal end point: myoclonic seizure) and the TS50 for the myoclonic-tonic-clonic sequence (maximal end point: tonic seizure). The correlation of the convulsive patterns with the dose and latency variations suggests that: (a) the neuromechanisms responsible for the tonic seizure and clonic seizure, located at brainstem and spinal cord levels, function at birth and reach maturity at 3 weeks of age; (b) the neuromechanisms responsible for the myoclonic manifestations and for catalepsy, located at the striato-thalamocortical level, start functioning at 2—3 weeks of age, indicating the later maturation of the more cephalic structures. (Mira DeCasrilevits, E. Engelhardt, C. A. Esbearard, British Journal of Pharmacology)

Atis is a small tree 3 to 5 meters in height. Leaves are somewhat hairy when young, oblong, 8 to 15 centimeters long, with a petiole 1 to 1.5 centimeters long. Flowers occur singly in the axils of the leaves, about 2.5 centimeters long, pendulous, hairy, three-angled, light green to yellow. Fruit is large, somewhat heart-shaped, 6 to 9 centimeters long, the outside marked with knobby polygonal tubercles. When ripe, the fruit is light yellowish-green. Flesh is white, sweet, soft, and juicy, with a mild and very agreeable flavor. (Philippine Medicinal Plants)

Atis is just starting to reach the local markets. Atis (*Annonasquamosa*) or Sugar Apple is part of the Annonaceae family that includes the more commonly known cherimoya in the west, guyabano or soursop and surprisingly, the ilang-ilang tree. It is actually not known where the atis is indigenous to but they grow in abundance throughout Central and South America. The Spaniards brought seeds to the Philippines in the early 17th century and the local name hails from the Aztec “ahate” according to Doreen Fernandez’s book on Philippine

fruit. The tree is relatively small and bears just a few dozen fruit when left to its own devices. But the fruit can be heaven, hundreds of seeds inside are coated with a soft sugary pulp or meat that tastes like a super sweet custard. The seeds can be a pain in the neck but if you enter an atis zen mode prior to breaking one open, you learn to work the seeds to get at the wonderful pulp. Atis does not travel very well and ripens rapidly so it isn't an export type fruit. When there is atis, there is a lot of atis. Last weekend I got some of the first ones to reach the market and paid a whopping PHP120 a kilo. But after 1-2 days left on the dining table they were ripe and super sweet. For some reason, atis tastes much better when served nice and cold. Place in the refrigerator at least 3-4 hours before eating. I have only eaten this fruit as is, never cooked or part of another dish. Atis seeds, by the way, are poisonous and you shouldn't swallow them. Worse, if they are dried and powdered, the powder can be used as a poison for catching fish, or as insecticides or my best find in terms of use: to remove lice from your hair. But be careful as the powder can cause blindness. (Market Manila) Manila, Philippines - The Department of Health (DOH) said yesterday that all leptospirosis patients from areas affected by heavy monsoon rains weeks ago are automatically considered members of the Philippine Health Insurance Corp. (Philhealth). DOH Secretary Enrique Ona explained this means that they do not have to pay Philhealth premiums but can enjoy Philhealth benefits from Aug. 1, 2012 to July 31, 2013. The privilege shall be applicable for all admissions from Aug. 7 up to the end of the month. Ona added the benefit is provided for under Philhealth Circular No. 39, series of 2012, which states that non-members living in flooded areas shall be accorded benefits under the Sponsored Program of the agency. For non-

members less than 21 years of age whose parents are not members, one parent shall be automatically covered. Under PhilHealth Circular 40 series of 2012, a case rate of P11, 000 shall be covered for moderate leptospirosis cases admitted in hospitals starting August 7. Severe leptospirosis cases, on the other hand, shall be reimbursed “ via fee-for-service scheme. "This covers conditions like leptospirosis icterohaemorrhagica, leptospirosis-associated kidney injury that requires emergency dialysis, meningitis in leptospirosis and pulmonary hemorrhage.“ Deaths, as per Philhealth Circular No. 15 series of 2011, shall be reimbursed via fee-for-serve scheme, " the circular said. Non-definitive final diagnosis such as suspected, to consider, probable or rule out leptospirosis may be denied or paid as fee-for-service, while pre or post-exposure antibiotic prophylaxis for leptospirosis are not covered by the scheme. (Sheila Crisostomo) Lobo, Batangas---The sugar apple capital of the province got a boost from Batangas governor Vilma Santos-Recto in her recent visit to the town with the distribution of about 200 seedlings of the fruit tree that thrives on the town’s steep limestone mountains and soil type. Sugar apple, locally known in the Philippines as Atis, used to be abundant in Lobo, hence the former tag of the town as the sugar apple capital of the Philippines. Lobo is known here as a character town that is isolated by the Mt. Banoy and Lipa's mountain ranges and the sea from the industrial and commercial city of Batangas, which is only 43 kilometers away. Despite the isolation, the town has been abreast with the technologies of first class municipality while balancing it with nature and agriculture. Recent reports from Philippine Information Agency say that Lobo is set to be developed by the tourism department as the province’s next tourist destination. Aside from sugar apple, Lobo also produces the biggest

supply of bananas, coconut oil, and export quality sweet tamarind in the province. According to Gov. Vi, she's also pushing for environment protection of the town, which is considered a natural paradise, and is only 43 kilometers east of Batangas City, where the capitol is located. The governor was accompanied by provincial administrator Engr. Vic Reyes, Lobo mayor Efren Diona and Lipa Archbishop Ramon Arguelles who also toured the town's sugar apple nursery. The provincial government also distributed mahogany seedlings there. Lobo used to be the Philippines sugar apple capital until 2003, when mealy bugs destroyed the trees and industry suffered a slow death. The revival of the sugar apple industry is now one of the provincial government's priorities, the governor said. (Mei Magsino, SLI) The most widely grown of all the Annona species, the sugar apple is more commonly found around the tropics of the Americas, India and Pakistan. Like most in the Annona species, sugar apple fruits are found on small trees that would grow up to about 8 meters tall. These trees will produce the sugar apple fruit that when ripe, will reveal fragrant, juicy, sweet and delicious creamy-white flesh. Many of these creamy flesh will enclose an oblong seed measuring about 1.25cm. An average sugar apple fruit may contain between 20 to 38 seeds in it. However, some sugar apple trees are known to produce seedless fruits. In Taiwan, a new variety of sugar apple fruit also known as the pineapple sugar apple fruit is being developed that is similar in sweetness with differences in taste. As its name suggests, this fruit would taste like pineapple (Southern Luzon Inquirer). Related Studies Potential Prebiotic Properties of Almond (*Amygdalus communis* L.) Seeds Almonds are known to have a number of nutritional benefits, including cholesterol-lowering effects and protection against diabetes. They are also a good

source of minerals and vitamin E, associated with promoting health and reducing the risk for chronic disease. For this study we investigated the potential prebiotic effect of almond seeds in vitro by using mixed fecal bacterial cultures. Two almond products, finely ground almonds (FG) and defatted finely ground almonds (DG), were subjected to a combined model of the gastrointestinal tract which included in vitro gastric and duodenal digestion, and the resulting fractions were subsequently used as substrates for the colonic model to assess their influence on the composition and metabolic activity of gut bacteria populations. FG significantly increased the populations of bifidobacteria and *Eubacterium rectale*, resulting in a higher prebiotic index (4.43) than was found for the commercial prebiotic fructooligosaccharides (4.08) at 24 h of incubation. No significant differences in the proportions of gut bacteria groups were detected in response to DG. The increase in the numbers of *Eubacterium rectale* during fermentation of FG correlated with increased butyrate production. In conclusion, we have shown that the addition of FG altered the composition of gut bacteria by stimulating the growth of bifidobacteria and *Eubacterium rectale*. The antiatherogenic, renal protective and immunomodulatory effects of purslane, pumpkin and flax seeds on hypercholesterolemic rats abnormal lipid metabolism is a main cause of dyslipidemia, which is a major risk factor for cardiovascular disease, obesity, cholelithiasis and overall mortality. The concentration of plasma cholesterol can be regulated by cholesterol biosynthesis, removal of cholesterol from the circulation, absorption of dietary cholesterol and excretion of cholesterol via bile and feces. In liver, such lipid accumulation initially results in fatty liver that develops fatty infiltration and in chronic stages results in damage of

hepatocytes, that causes gross fatty infiltration in parenchyma cells of liver. It is well known that diet plays an important role in the control of cholesterol homeostasis. In this context, it has been reported that herbs have been used as food and for medicinal purpose for hyperlipidemia that may be useful in reducing the risk of cardiovascular disease and alterations in liver metabolism. It is important to have a balance of omega-3 and omega-6 in the diet. The typical American diet tends to contain 14-25 times more omega-6 fatty acids than omega-3 fatty acids. The Mediterranean diet, on the other hand, has a healthier balance between omega-3 and omega-6 fatty acids. Recent studies have demonstrated that ingestion of polyunsaturated fatty acids (ω-3 and ω-6) including alpha linolenic acid (ALA), present in vegetable oils, is inversely related to the incidence of heart disease by decreasing cholesterol and triacylglycerol plasmatic levels. Flaxseed (*Linum usitatissimum*), also known as linseed, contains 32–45% of its mass as oil of which 51–55% is alpha-linolenic acid (ALA) (18: 3 n-3 Omega-3 fatty acid), a precursor to eicosapentanoic acid EPA, as well as being a good source of dietary fibers and lignans. Flaxseed oil (FO) is readily available in the diet as flaxseed is incorporated into many commonly consumed foods such as breads, muffins and cereals. FO is one of the vegetable sources of ALA and its content ranges from approximately 40% to 60% of the total fatty acids. Clinical conditions such as cardiovascular disease, blood pressure, cancer, skin diseases and immune disorders such as renal failure, rheumatoid arthritis and multiple sclerosis may be prevented by ALA in flaxseed oil. Pumpkins belong to the family of Cucurbitaceae. Pumpkin seeds are a popular snack food in several countries among of which is Greece. They are consumed either raw or roasted (salted or not) and used in cooking

and baking as an ingredient of bread, cereals, salads and cakes. Moreover, pumpkin seed oil nowadays gains wide acceptance not only as edible oil but as a nutraceutical, too. Pumpkin seed and seed oil have been implicated in providing many health benefits, which are attributed to their macro- and micro-constituent composition. They are a rich natural source of proteins, phytosterols, polyunsaturated fatty acids, antioxidant vitamins such as carotenoids and tocopherol and trace elements, such as zinc. It also contains 40.4-55.6% of linolenic acid: LA; 18:2 n-6, ω -6 fatty acid.

Portulacaoleracea (Portulacaceae family), also referred to as the common purslane, is listed in the World Health Organization as one of the most used medicinal plants and it has been given the term 'Global Panacea'. The purslane contains many compounds, including alkaloids, omega-3 fatty acids, vitamins (mainly vitamin A, vitamin C, and some vitamin B and carotenoids), as well as dietary minerals, such as magnesium, calcium, potassium and iron. It is also rich in coumarins, flavonoids, polysaccharide, cardiac glycosides, and anthraquinone glycosides. Many studies have demonstrated various pharmacological effects of this plant including hypoglycaemic, hypocholesterolemic and antioxidant effects. In this study, pumpkin seed was used as a source of ω -6 fatty acids, while purslane or flax seeds were used as sources of ω -3 fatty acids. The objective of the current study was to examine the efficiency of using either flax/ pumpkin or purslane/pumpkin seed mixture (components of ω -3 and ω -6) on hyperlipidemia, kidney function and as immunomodulators in rats fed high cholesterol diets. Delaying the atrophied hepatocytes from progression to fibrosis in dimethylnitrosamine (DMN)-induced liver injury in rats using the fatty acids of corn kernels Amygdalin (D-mandelonitrile- β -D-glucoside-6- β -

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glucoside) degrades to hydrogen cyanide, two molecules of glucose and benzaldehyde. Amygdalin hydrolysis is catalyzed by the enzyme emulsin, a β -glucosidase also found in apricot kernels. Since β -glucosidase enzymes do not occur intracellularly in humans, swallowing of whole apricot kernels may not release much cyanide, cyanogenetic glycosides may be essential for plant development and growth; the studies are represented by the work of. However, the primary concern is their occurrence in food supplies and the potential adverse effects of long-term, low-level consumption. Cases of chronic cyanogen poisoning are documented in Third World areas, where cassava (*Manihota esculenta*) that is a major food source. After consumption of apricot and other fruit seeds, bitter almonds, cassava, or bamboo shoots, cyanide (CN) could be produced in high enough levels from the hydrolysis of amygdalin, and other cyanogenetic glycosides to pose a potential chronic toxicity problem. These compounds may have evolved in plants as a chemical defense against grazing animals, as evidenced by the lethality of chokecherry leaves to livestock and the apparent teratogenic effect of *P. armenlaca* in swine. Liver injury is caused by different agents, such as viruses, chemicals, alcohol, and auto-immune diseases. It was pointed out that Dimethylnitrosamine (DMN) is a potent hepatotoxin that can cause fibrosis of the liver. At high doses, it is a "potent hepatotoxin that can cause fibrosis of the liver" in rats. DMN is a potent hepatotoxin, carcinogen, and mutagen. DMN-induced liver injury in rats seems to be a good animal model for early liver cirrhosis. A model of cirrhosis induced by chronic, discontinuous treatment with a low dose of DMN in the rat has been reported to reproduce a number of characteristics of this liver disease. The extent of liver injury can be easily estimated by measuring the activities of certain

plasma enzymes, e. g., alanine aminotransferase (ALT) and aspartate aminotransferase (AST). Hepatic fibrosis is a common result of chronic injury to the liver. Hepatic fibrosis is a consequence of severe liver damage and occurs in many forms of chronic liver damage, including virus infection, autoimmune liver diseases and sustained alcohol abuse. However, the hepatoprotective effect of apricot kernel in dimethylnitrosamine (DMN)-induced models has rarely studied. The DMN-induced liver fibrosis model can reproduce most of the features observed during human liver fibrosis. Furthermore, this model has other advantages such as progressive and remarkable pathological alterations, a high fibrosis reproduction rate, and a low mortality rate in experimental animals. This model is also stable even after termination of DMN administration and is a reliable tool for screening antifibrotic agents. Therefore, the aim of the present study was to examine the effect of ground apricot kernel (GAK) on hepatic fibrosis in rats.

Toxicity of Akee(Blighiasapida) to Different Animals. The toxicity of the akee was long misunderstood and believed to reside in the membranes attaching the arils to the jacket, or only in the overripe and decomposing arils. There have been intensive clinical and chemical studies of the akee and its effects since 1940, and it is now known that the unripe arils contain hypoglycin, α -amino-B-(2-methylenecyclopropyl) propionic acid, formerly called hypoglycin A. This toxic property is largely dispelled by light as the jacket opens. When fully ripe, the arils still possess 1/12 of the amount in the unripe. The seeds are always poisonous. They contain hypoglycin and its γ -glutamyl derivative, γ -L-glutamyl α -amino-B-(2-methylene cyclopropyl) propionic acid, formerly called hypoglycin B. The latter is 1/2 as toxic as the former. In feeding experiments at the University of Miami, Dr. Edward Larson found that the

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membrane of open fruits was harmless; rabbits were readily killed by the unripe arils; rats were resistant and had to be force fed to be fatally poisoned. I have found that squirrels will make holes in the unopened fruits on the tree to consume the unripe arils but they leave the seeds untouched. Akee poisoning in humans is evidenced by acute vomiting, sometimes repeated, without diarrhea (called "vomiting sickness" in Jamaica), followed by drowsiness, convulsions, coma and, too often, death. Because of hypoglycaemic effects, administration of sugar solutions have been found helpful. Most cases occur in winter in Jamaica when 30% to 50% of the arils have small, underdeveloped seeds, often not apparent externally. Ingestion of such arils, raw or cooked, is hazardous. For more information on the toxicity of the akee, one may consult Kean, Hypoglycin (1975), and Morton, Forensic Medicine, Vol. III, Chap. 71 (1977). Pomegranate Seed Oil Reduces Intestinal Damage in a Rat Model of Necrotizing Enterocolitis. Pomegranate seed oil (PSO), which is the major source of conjugated linolenic acids such as punicic acid (PuA), exhibits strong anti-inflammatory properties.

Necrotizing enterocolitis (NEC) is a devastating disease associated with severe and excessive intestinal inflammation. The aim of this study was to evaluate the effects of orally administered PSO on the development of NEC, intestinal epithelial proliferation, and cytokine regulation in a rat model of NEC. Premature rats were divided into three groups: dam fed (DF), formula-fed rats (FF), or rats fed with formula supplemented with 1.5% of PSO (FF+PSO). All groups were exposed to asphyxia/cold stress to induce NEC. Intestinal injury, epithelial cell proliferation, cytokine production, and trefoil factor 3 (Tff3) production were evaluated in the terminal ileum. Oral administration of PSO (FF+PSO) decreased the incidence of NEC from 61% to

26%. Feeding formula with PSO improved enterocyte proliferation in the site of injury. Increased levels of pro-inflammatory IL-6, IL-8, IL-12, IL-23, and TNF- α in the ileum of FF rats were normalized in PSO treated animals. Tff3 production in the FF rats was reduced compared to DF but not further affected by the PSO. In conclusion, administration of PSO protects against NEC in the neonatal rat model. This protective effect is associated with an improvement of intestinal epithelial homeostasis and a strong anti-inflammatory effect of PSO on the developing intestinal mucosa.

Justification of the Study Previous studies reported that liver injury is caused by different agents, such as viruses, chemicals, alcohol, and auto-immune diseases. Also, the main focuses of the related studies are the determination of the effect of some pulverized seeds which are injected, used or given to the test animal, usually rats. In relevance to this, the present research study aims to identify what will be the effect on the liver, cause of death or decrease in the mortality rate of the rat when pulverized Sugar Apple (*Annon squamosa* Linn.) seeds are injected or given to the rats. The research, likewise from the previous studies, aims to determine the effect of the pulverized seed to the rat.