

## REVIEW

### PHILIPPINE PLANTS AS POSSIBLE SOURCES OF ANTIFERTILITY AGENTS

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#### ABSTRACT

Two lists of plants (a) those reputed to have antifertility and abortifacient properties and (b) those tested in animals or humans are presented. While many of these plants have already been tested for antifertility activities and proven to be effective in animals and/or humans, some of the studies reveal that there are many deficiencies of in-vivo experiments in animals. Some plants that have been thoroughly studied are the ordinary pea or "sitsaro" (*Pisum sativum*), "buding" (*Polygonum hydropiper*) and "kamala" (*Mallotus philippinensis*). Gossypol isolated from *Gossypium herbaceum* and m-xylohydroquinone isolated from *P. sativum* have already been tried in humans and found effective. Similar works of various authors are cited.

#### INTRODUCTION

Overpopulation is one of the problems confronting not only the Philippines but also most of the other countries of Asia. Over half of the world's population (57%) lives in Asia (Asian-Pacific Population Programme News, 1978). Thirty-three countries in Asia report increase in population rates of 2% or more and 15 of these have rates of 3% or more. The annual population rate of the Philippines currently is between 2.6 and 2.8%, compared to 3.1% during the early seventies. This shows only 0.3% lowering of the population growth rate. This may be due to the use of contraceptive methods that may be safer but are also less effective in preventing pregnancy (Zeidenstein, 1978). The challenge therefore to contraceptive research (Greep *et al*, 1978) is to come up with a broad array of contraceptive methods that require less complex distribution systems; that are safer and less discomforting, combine high acceptability with longer use, and are suited to the diverse requirements of the world.

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One of the methods which could meet most of these criteria would be the use of locally available plants for fertility regulation. This method would be highly acceptable because of convenience in administration since these plants could be included in the diet and with minimum side effects, if any. If the active principles from the plant could be isolated by simple means, these processes could be taken up by the drug industry to produce cheaper and safer contraceptives.

The World Health Organization recently initiated through its Special Programme of Research, Development and Research Training in Human Reproduction, six centers designated to carry out research aimed at finding new and effective fertility-regulating agents from plants. These centers are the Federal University of Pernambuco, Recife, Brazil; the Chinese University of Hongkong; the Natural Products Research Institute, National University, Seoul, Republic of Korea; the University of Sri Lanka; the City University, London, UK; and the College of Pharmacy, University of Illinois Medical Center, Chicago, Illinois, USA. Each research group includes experts in reproductive biology and chemistry of natural products. Information on this subject so far available, covering about 3,000 plants, revealed many deficiencies in *in-vivo* experiments on animals due to poor experimental design, lack of suitable controls, insufficient experimental details to substantiate the conclusions or even inappropriate conclusions based on the data reported (Soejarto *et al.*, 1978).

This review was made primarily to inform the public of the use of plants as possible antifertility agents in humans and secondly, to help researchers interested in the study of plants as antifertility agents in the choice of plants and research problems.

#### *Choice for an Ideal Antifertility Drug*

The criteria for an antifertility drug are: 1) effectivity – must be demonstrated in rigidly controlled, accurate experimental animals and actual clinical tests; 2) potency – must be potent enough to elicit the effect for adequate periods of time; 3) safety – the agent must be non-toxic with a high therapeutic index, with minimal side effects and should not be abortifacient; 4) specificity – it must act without apparently interfering with sexual activity or diminishing or abolishing *libido*; and 5) rapid reversibility – it must allow a swift return to normal fertility status after cessation of the administration (Mier, 1959).

#### *Plants with Alleged Antifertility and/or Abortifacient Properties*

Table I shows plants with alleged antifertility and/or abortifacient properties, listed alphabetically according to genera. Some of the more common

ones are the following: *Ananas comosus* (Linn.) Merr. (*piña*), *Anona squamosa* Linn. (*atis*), *Apium graveolens* Linn. (*kinchay*), *Areca catechu* Linn. (*bunga*), *Carica papaya* Linn. (*papaya*), *Hibiscus rosasinensis* Linn. (*gumamela*), *Lagenaria siceracia* (Mol.) Standley (*upo*), *Leucaena leucocephala* (Lam.) de Wit (*ipil-ipil*), *Momordica charantia* Linn. (*ampalaya*), *Moringa oleifera* Lam. (*malunggay*), *Piper nigrum* Linn. (*paminta*) and *Sesamum orientale* Linn. (*linga*).

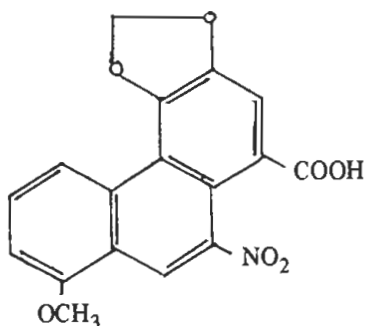
#### Plants Tested in Animals and/or Humans

Local plants that have been screened or studied for antifertility activity in animals and/or humans are listed in Table II. Eight of the more common plants allegedly reported to have antifertility and/or abortifacient properties were tested for antifertility activity in animals and were found active. These are *Ananas comosus*, *Anona squamosa*, *Areca catechu*, *Carica papaya*, *Hibiscus rosasinensis*, *Leucaena leucocephala*, *Momordica charantia* and *Piper nigrum*. The other common ones found active in animals are as follows: *Aloe barbadensis* Mill. (*sabila*), *Catharanthus roseus* (L.) G. Don (*chichirica*), *Citrus aurantium* L. (*dalandan*), *Daucus carota* L. (*carrot*), *Phaseolus aureus* Roxb. (*mongo*) and *Pisum sativum* L. (*chicharo*).

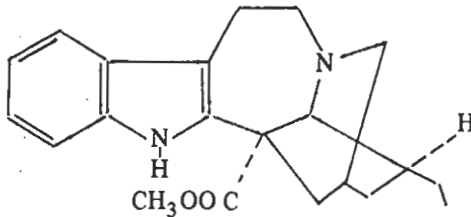
#### Antifertility Agents from some Local Plants

Some of these plants have already been studied in detail and active principles have been isolated and tested. The pure active compounds isolated from these plants are listed below together with their chemical structure, their source and their pharmacological activity.

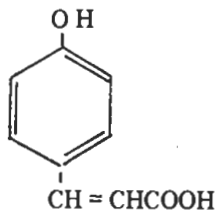
Compound/Structure	Source	Antifertility Activity
1. Aristolochic acid	<i>Aristolochia indica</i> Blanco	Feeding male houseflies w/0.075% aristolochic acid induced sterility (Mathur <i>et al</i> , 1980)



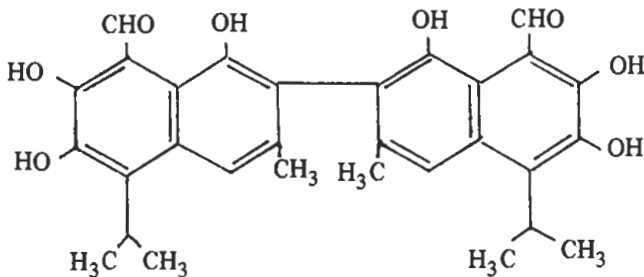
2. Coronaridine *Tabernaemontana\**  
*heyneana* Antifertility effect in rats at 5 mg/  
kg/day (Meyer *et al*, 1973)



3. p-Coumaric acid *Aristolochia indica*  
Linn. 100% interceptive activity in 6 day  
of pregnant mice at a simple oral  
dose of 50 mg/kg body weight  
(Pakrashi *et al*, 1979)

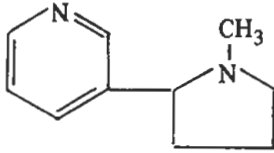


4. Gossypol *Gossypium hirsutum*  
Linn. Inhibited fertility of male rats.  
99.8% effective in healthy men as  
evaluated by semen examination  
(National Coordinating Group on  
Male Antifertility Agents, 1979).

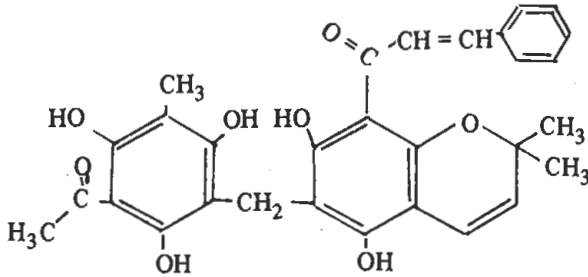
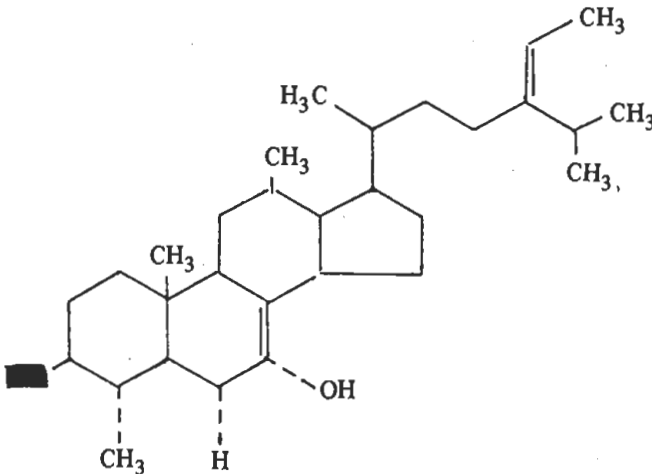


\*This species of *Tabernaemontana* is not found in the Philippines but *T. pandacaqui* (presently known as *Ervatamia pandacaqui* (Poir.) Pich.) which also contains coronaridine is found abundant in Laguna and Batangas.

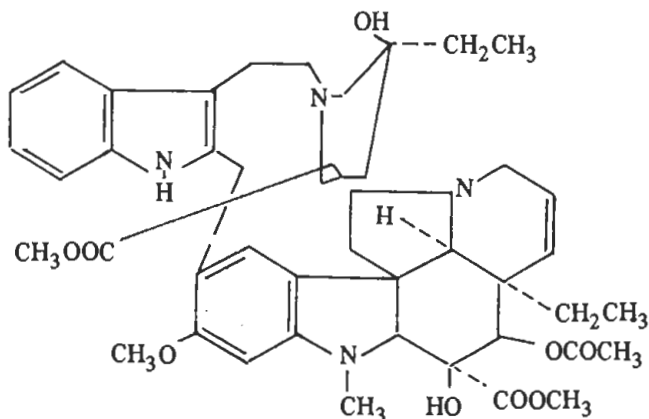
## 5. Nicotine

*Nicotiana tabacum*  
Linn.Caused an increase in number of stillborn in rats; alters ovarian cycle in humans through smoking (Farnsworth *et al.*, 1975)

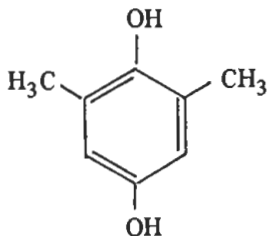
## 6. Rottlerin

*Mallotus philippinensis*  
(Lam.) Muell-Arg.100% effective in a 10-day and 84% effective in a 20-day period at 10 mg/kg in rats (Gujral *et al.*, 1960). 20 mg/kg produced 100% infertility in rats (Gujral *et al.*, 1960).7. 5-Stigmastene  
3 $\beta$ , 7 $\alpha$  diol*Ananas comosus*  
(Linn.) Merr.Showed significant antifertility activity in mice (Pakrashi *et al.*, 1975).

8. Vinblastine *Catharanthus roseus* (Linn.) Don 0.3-0.5 mg/kg I.V. caused 60% reduction in normal fetuses in rabbits (Farnsworth *et al.*, 1975).



9. *m*-xylohydroquinone *Pisum sativum* Linn. Produced fetal resorption in pregnant rats when given during the 1st 8 or 10 days of pregnancy (Farnsworth *et al.*, 1975). Reduced pregnancy rate of Indian women by 1/2 as compared with the control (Sanyal, 1962). Effective in women treated 2 times a month with 150-350 mg doses (Farnsworth *et al.*, 1975).



The above list includes alkaloids (cpds. 2, 5 and 8), organic acids (cpds. 1 and 3), phenolic compounds (nos. 4, 6 and 9) and a sterol (cpd. 7). A waxy alkaloid from *Piper longum* Linn. showed significant anti-implantation activity and early abortifacient activity (Ohandoke *et al.*, 1978). The fixed oil from the nut of *Areca catechu* Linn. showed significant activity in rats at 500 mg/kg dose (Garg, 1974). A saponin mixture obtained from the rhizomes of *Costus speciosus* (Koen) J.E. Am. prevented pregnancy in 80% of rats when fed on days 1-7 of pregnancy at a dose of 50  $\mu$ g/100g (Tewari *et al.*, 1973). The simple amines, fatty acids, flavonols, coumestans, sterols and polyphenols besides alkaloids and hydroquinones are also possible antifertility drugs from plants that stimulate contraction of the uterus. These compounds, found to be active in animals as anti-fertility agents, are varied, since the reproductive system is complex and there are several modes of action possible.

### *Modes of Action of Antifertility Drugs*

There are two types of antifertility drugs, one affecting the male and the other affecting the female (Gourley *et al*, 1964).

- A. Antifertility substances for the male can elicit their effect through any of the following modes:
1. Interference with hormonal control
  2. Direct inhibition or destruction of spermatogenic cells at various stages of development
  3. Imposing a pharmacologic effect so that spermatogenesis continues unhindered but the spermatozoa produced are infertile.
- B. Antifertility substances for the female can elicit their effect through any of the following modes:
1. Interference with hormonal control — interference with pituitary gonadotropin secretion which maintains the ovary throughout life.  
Example: steroidal or non-steroidal inhibition of gonadotropins.
  2. Direct inhibition or destruction of the ova and its precursors.
  3. Chemical interference with gestation or pregnancy meaning the drug could be abortive. This action can be further subdivided into:
    - a) interference with the complex series of events involved preparatory to and during implantation
    - b) direct toxic action on varying stages of development of the placenta
    - c) direct toxic action on the fetus

Antifertility effects can be performed in male or female animals by interference with gonadotropin production or possibly blocking its site of action. Gonadotropins are hormones which stimulates the reproductive organs and therefore control ovulation, gametogenesis and luteinization or formation of the corpus luteum. The corpus luteum is a temporary organ secreting the hormone progesterone which favors the establishment and continuity of pregnancy.

### *Animal Screening Tests*

For screening purposes, it would be useful to have a simple standard test for each of the different modes of action in both the male and female species. However, such test will not easily become available for the following reasons (Mantegazza and Piccini, 1976):

1. The physiology of reproduction is complex.
2. The reproductive mechanisms differ not only between animals and humans but also from species to species.
3. Generally, the drugs interfere with more than one of the various phases of the reproductive process.

The animals more commonly used in these tests are rats and mice but guinea pigs, rabbits, cats and monkeys have also been employed. A simple screening test has been adopted in female rodents using fetuses in utero as the parameter, the so-called Female Mouse Fertility Screen (Hall *et al*, 1974). In this method, the females are administered the drug ten days before mating and is continued for eighteen more days during mating. The females are sacrificed and autopsied on the nineteenth day of mating and the number of viable fetuses noted. At the National Institute of Science and Technology (NIST), a modified method has been used in screening extracts from local plants for antifertility activity in female mice. The preliminary results of such screening will be reported separately (Herrera *et al*, unpublished).

#### *Toxicity Testing*

As far as toxicity of drugs affecting fertility is concerned the usual acute and sub-acute toxicity tests are done. For the evaluation of side effects, the drugs should be devoid of estrogenic, progestational, androgenic and corticoid activities. Teratological studies must also be performed so that should complete fertility control not be achieved, damage to the fetus is avoided (Mantegazza and Piccini, 1966).

### SUMMARY AND CONCLUSION

One can easily select the plants that could be investigated for antifertility activity in animals from Tables I and II. Although many local plants have been tested for antifertility activity, only a few have been thoroughly studied so that there is still a very broad area of research on antifertility drugs from plants. There is much to be studied starting with developing a method to be used, selecting the plants that are easily available, determining the kind of plant extracts to be tested and the most critical part, evaluating the results obtained. From the reports of various researchers, the presence of antifertility substances in plants such as alkaloids, hydroquinones, sterols, organic acids, saponins and other plant constituents has been confirmed and quite a few of them such as meta-xylohydroquinone have also been proven to be effective in humans.

The promise of discovering antifertility drugs from our local plants is great, although it will take years of continuous experimentation in animals



and finally clinical trials in human subjects before an isolated purified plant constituent could be regarded as effective and safe for human consumption.

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Table 1. Plants found in the Philippines claimed to possess antifertility activity

Scientific Name (Family)	Local Names (Merrill, 1926; Quisumbing, 1951).	Part Used	Method of Administration	Country	Reference
<i>Abroma augusta</i> (Linn. <sup>a</sup> ) Linn. (Sterculiaceae)	<i>anado, ambong, anibiong</i> <i>anibong</i> , perennial Indian hemp, devil's cotton	—	—	India	8, 33
<i>Abrus precatorius</i> Linn. (Leguminosae)	<i>saga, saga-saga, bañgati, kansaga,</i> <i>sagamamin</i> , jequirity seeds, prayer beads (Engl.)	seeds	Powder is eaten, taken as is by women	India	8, 33
<i>Achyranthes aspera</i> Linn. <sup>a</sup> (Amaranthaceae)	<i>hangod, dokot-dokot</i> , prickly chaff flower	roots	Root paste is used	India	8, 33
<i>Acorus calamus</i> Linn. (Araceae)	<i>lubigan</i> , sweet flag, <i>acoro</i>	roots	Decoction is drunk with milk, after menstruation	India	33
<i>Albizia lebeck</i> (Linn.) Benth. (Leguminosae)	<i>langil, aninapla, acacia</i> (Sp.) Ho-huan (Chinese), <i>Mimosa</i> (Engl.)	bark, seeds	—	India	33
<i>Aloe vera</i> Linn. <sup>a</sup> (Liliaceae)	<i>sabila, sabila-piña, aloe</i>	—	Fresh or dried berry decoction drunk as contraceptive. Fruit or plant infusion drunk to induce menstruation	—	8
<i>Anona squamosa</i> Linn. <sup>a</sup> (Anonaceae)	<i>atis</i> , sugar apple, sweet sap	—	—	India	8
<i>Kibatatia blancoi</i> (Rolfe) Merr. (Apocynaceae)	<i>laniting gubat</i>	root, root bark	Decoction is drunk	Philippines	47

Table I. (continued)

Scientific Name (Family)	Local Names (Merrill, 1926; Quisumbing, 1951).	Part Used	Method of Administration	Country	Reference
<i>Lagenaria siceraria</i> (Mol.) Standley (Cucurbitaceae)	upo, oyo, gourd, bottle gourd, white pumpkin	fruit, seed	—	India	33
<i>Lawsontia inermis</i> Linn. (Lythraceae)	sinamomo, cinamomo (Sp.), henna (Engl.)	leaf	Fresh juice is taken orally with sugar and water. Decoction is drunk	India	8, 47
<i>Leucaena leucocephala</i> (Lam.) de Wit (Leguminosae)	ipil-ipil, ipel, Sta. Elena (Sp.)	root, root bark	Decoction of root and bark used	Africa, India West Indies, Central America	47, 32
<i>Luffa acutangula</i> (Linn.) Rozb. <sup>a</sup> (Cucurbitaceae)	patola	—	—	India	8
<i>Mallotus philippinensis</i> (Lam.) Muell-Arg. (Euphorbiaceae)	banato, sala, daradag	fruit	Decoction is used	India	47, 33
<i>Michelia champaca</i> Linn. (Magnoliaceae)	champaca, sampaka, champakang-pula	flower, seed, root bark	—	India	8, 47
<i>Momordica charantia</i> Linn. <sup>a</sup> (Cucurbitaceae)	amargoso, ampalaya, margoso, balsam apple, balsam pear, african cucumber, tuberculated momordica, bitter gourd	fruit, root	Decoction is drunk in large doses	India	8, 47
<i>Moringa oleifera</i> Lam. <sup>a</sup> (Moringaceae)	malungai, malongai, kalongai, kalmalungai, horse-radish tree	seed oil	Gum from the oil is used	India	8, 47
<i>Nasturtium officinale</i> R. Br. (Compositae)	water cress	—	Cooked or eaten raw, assists menstruation and removes fetus	Western Europe	32



<i>Nerium indicum</i> Mill. <sup>a</sup> (Apocynaceae)	<i>adelfa</i> , oleander	—	—	India	8, 47
<i>Ocimum basilicum</i> Linn. (Labiatae)	<i>balanoi</i> , <i>albanaka</i> , <i>solasi</i> , sweet basil	Leaf	Chewed	Gunantuna	8
<i>Ocimum sanctum</i> Linn. (Labiatae)	<i>sulasi</i> , <i>loko-loko</i> , sacred basil, holy basil (Engl.)	Leaf	Taken orally	India	8
<i>Pandanus tectorius</i> Solander <sup>a</sup> (Pandanaceae)	<i>pandan</i> , <i>pandan dagat</i>	—	Decoction drunk	Philippines	47
<i>Piper longum</i> Linn. (Piperaceae)	<i>litlit</i> , <i>kayuñgo</i> , <i>sabia</i> , <i>saimara</i> , <i>soag-matsing</i> , <i>subon-manok</i>	fruit	—	India	8
<i>Piper nigrum</i> Linn. (Piperaceae)	<i>parmina</i> , <i>malisa</i> , <i>pimienta</i> (Sp.), pepper (Engl.)	fruit	Taken in pills with honey and ginger	India Malay	47
<i>Pisum sativum</i> Linn. (Leguminosae)	<i>chicharo</i> , peas	seed	—	India	8, 33
<i>Pithecolobium dulce</i> (Roxb.) Benth. <sup>a</sup> (Leguminosae)	<i>kamachile</i> , <i>kamonsiles</i>	Leaf	Taken with salt	Mexico	47
<i>Plantago lanceolata</i> Linn. (Plantaginaceae)	<i>lanting-haba</i>	whole plant	Powdered plant mixed with diet (25-50% conc.)	India Central Europe	32
<i>Plumbago zeylanica</i> Linn. (Plumbaginaceae)	<i>sangdikit</i> , Ceylon lead wort (Engl.)	root, fruit	Decoction is drunk	India	8, 33
<i>Plumbago indica</i> Linn. <sup>a</sup> (Plumbaginaceae)	<i>laurel</i>	—	—	India	8
<i>Plumeria acuminata</i> Ait. <sup>a</sup> (Apocynaceae)	<i>kalachuchi</i> , <i>kalachuche</i> <i>kalasusi</i> , <i>kalasutsi</i>	root	—	India	47
<i>Polyalthia suberosa</i> (Roxb.) Thw. <sup>a</sup> (Anonaceae)	<i>duhat matsing</i> , <i>balingmanok</i> , <i>duhat-duhatan</i> , <i>lanutan</i> , <i>tagpu-tagpuan</i>	root	Decoction of fresh roots drunk	Philippines	47

Table 1. (continued)

Scientific Name (Family)	Local Names (Merrill, 1926; Quisumbing, 1951)	Part Used	Method of Administration	Country	Reference
<i>Polygonum hydro Piper</i> Linn. (Polygonaceae)	<i>buding, agagat, tuba</i>	whole plant	Infusion is drunk	Europe	32
<i>Pongamia pinnata</i> (Linn.) Merr. <sup>a</sup> (Leguminosae)	<i>bani, balik-balik, balot-balot, bayog-bayok, kadel</i>	bark	—	Philippines	47
<i>Punica granatum</i> Linn. <sup>a</sup> (Punicaceae)	<i>granada</i> (Sp. Tag.) pomegranate (Engl.)	—	—	India	8
<i>Rauwolfia serpentina</i> Benth. (Apocynaceae)	—	root	—	India	33
<i>Rhynchosia minima</i> (Linn.) <sup>a</sup> (Leguminosae)	<i>kadil</i>	—	—	India	8
<i>Ricinus communis</i> Linn. (Euphorbiaceae)	castor oil plant, <i>tangan-tangan</i>	seed	Eaten one day after delivery	India	33
<i>Rosmarinus officinalis</i> Linn. (Labiatae)	<i>romero, rosemary</i>	whole plant	Decoction with "Ocean Artemisia"	Central America (Opata India)	32
<i>Rubus moluccanus</i> Linn. (Rosaceae)	<i>sapinit</i>	leaf	—	India	47
<i>Salacia prinooides</i> (Willd.) DC <sup>a</sup> (Hippocrateaceae)	<i>matang-ulang</i>	root	Decoction of dried roots is drunk	Philippines	47
<i>Salvia plebeia</i> R. Br. <sup>a</sup> (Labiatae)	—	—	—	India	8
<i>Sesamum indicum</i> Linn. (S. Orientale) (Pedaliaceae)	<i>linga, laŕga, liŕgo, gingely</i> oil plant, sesame, <i>ajonjoli</i> (Sp.), <i>balakbak</i>	seed	Ground to a paste with water and given in large quantities	India	47

<i>Sesbania aegyptica</i> F. Vill Novis (Leguminosae)	—	root, leaf	—	India	8, 33
<i>Sesbania sesban</i> (Linn.) Merr. (Leguminosae)	—	—	—	India	8
<i>Semecarpus anacardium</i> Blco. (Anacardiaceae)	<i>figos, pavak</i> or agni tree	root	Root is cooked in sour rice water taken for 3 days at end of menstruation produces sterility	India	32
<i>Sida rhombifolia</i> Linn. ssp. <i>rhombifolia</i> (Malvaceae)	<i>ualis-haba, eskobang haba, walis-walisan, yellow barleria</i> (Engl.)	—	—	—	8, 32
<i>Solanum nigrum</i> Linn. <sup>a</sup> (Solanaceae)	<i>lubi-lubi, anti, gamagamatisan, kamakamatisan, konti, onti, black night shade, deadly night shade</i> (Eng.)	—	—	India	22
<i>Solanum verbascifolium</i> Linn. (Solanaceae)	<i>malatalong, malatabako</i>	leaf	—	Malay Peninsula	47
<i>Syzygium malaccense</i> (L.) Merr. & Perry (Myrtaceae)	<i>makopang-kalabau, makopa tamo, yambu, tersana rose apple, Malay apple</i>	root bark	—	India	47
<i>Thevetia peruviana</i> (Pers.) Merr. <sup>a</sup> (Apocynaceae)	<i>campanero, campanilla</i> Narciso amarillo, yellow oleander, oleander lucky nut	seed	—	Bengal	8, 47
<i>Trianthema portulacastrum</i> Linn. <sup>a</sup> (Aizoaceae)	<i>Toston</i>	root	Decoction is administered in large dose	India Philippines	10, 47
<i>Trichosanthes bracteata</i> (Lam.) Voight <sup>a</sup> (Cucurbitaceae)	—	—	—	India	8

Table 1. (continued)

Scientific Name (Family)	Local Names (Merrill, 1926; Quisumbing, 1951).	Part Used	Method of Administration	Country	Reference
<i>Trichosanthes cucumerina</i> Linn. (Cucurbitaceae)	<i>tabubok, melon-daga</i> <i>melon-melonan</i>	—	—	India	8
<i>Triumfetta rhomboidea</i> Jacq. ( <i>T. bartramia</i> ) (Tiliaceae)	<i>kolotang bilog</i>	—	—	India	8
<i>Urena lagopoides</i> (Linn.) Desv. ex DC. <sup>a</sup> (Leguminosae)	<i>basingkaran, ikugkuting</i>	—	—	India	8
<i>Urena lobata</i> Linn. (Malvaceae)	<i>dalupang, kulotan, kulut- kulutan, patsin mangkit, malopolo</i>	leaf	Leaves are chewed and juice is swallowed	Borneo New Ireland, India	8, 47, 32
<i>Vinca rosea</i> Linn. <sup>a</sup> ( <i>Catharanthus roseus</i> ) (Apocynaceae)	<i>chichirica, amnias, atardia, kantotan, sitchirica, pink</i> periwinkle, Madagascar periwinkle, San Pedro (Sp.)	root	Decoction is drunk	Philippines	47
<i>Anodendron paniculatum</i> DC. <sup>a</sup> (Apocynaceae)	<i>malamalauau</i>	root	Root crushed in water taken 3 or 5 times at intervals of 2-3 hrs to aid parturition	Bengal	32

<i>Ananas comosus</i> (Linn.) Merr. <sup>3</sup> (Bromeliaceae)	<i>piña</i> , pineapple	fruit, juice	Fresh juice is taken raw, Malaya sometimes salt added. Juice of immature fruit taken in large doses	India	8, 32, 47
<i>Apium graveolens</i> Linn. <sup>3</sup> (Umbellifera)	<i>kinchai</i> , <i>kintsai</i> , <i>guichai</i> , Chi'n-nut' ai (Chinese) celery (Engl.)	—	—	India	8
<i>Arcangelisia flava</i> (Linn.) Merr. <sup>3</sup> (Menispermaceae)	<i>suma</i> , buti, lagtang	root, stem	Strong decoction is drunk	Philippines	47
<i>Areca catechu</i> Linn. (Palmae)	<i>bunga</i> , areca nut, betel-nut palm (Engl.)	fruit, leaf	Decoction taken	Philippines	8, 47
<i>Argemone mexicana</i> Linn. <sup>3</sup> (Papaveraceae)	<i>kachumba</i> , <i>diluariu</i> , Mexican poppy, prickly poppy, golden thistle of Peru	—	—	India	8
<i>Aristolochia sericea</i> Blanco <sup>3</sup> (Aristolochiaceae)	<i>bangisi</i>	root	Root macerated in spirituous liquor is taken	Philippines	47
<i>Aristolochia indica</i> Blanco <sup>3</sup> (Aristolochiaceae)	<i>timbangon</i> , <i>tagala</i>	root	—	India	8, 33
<i>Artemisia vulgaris</i> Linn. <sup>3</sup> (Compositae)	<i>damong maria</i> , <i>cintura de San Jose</i> , Sta Maria, <i>kamaria</i> worm- wood felson herb, mugwort, motherwort, maiden wort	leaf	Infusion is taken	India Philippines	8, 33
<i>Asclepias syriaca</i> Blanco (Asclepiadaceae)	curacao milkweed, bulak- <i>bulakan</i> , <i>bulak-damo</i> , <i>kapol- kapol</i> , blood flower, red-head cotton, bush niño muerto, plan- tanillo amores de los casados mal casade, herbe deraton	root, rhizome	Infusion is drunk to produce temporary sterility. Handful of roots and rhizomes dried and powdered, infused for 20 min. in pint of water	Quebec Canada	12

Table 1. (continued)

Scientific Name (Family)	Local Names (Merrill, 1926; Quisumbing, 1951).	Part Used	Method of Administration	Country	Reference
<i>Asparagus officinalis</i> Linn. (Liliaceae)	asparagus	fruit	and drunk to produce temporary sterility Decoction is drunk	South Europe	8, 32
<i>Averrhoa carambola</i> Linn. (Oxalidaceae)	<i>balimbing</i> , <i>balimbín</i> , <i>sirináté</i> (Sp.)	seed	Infusion or decoction of crushed seeds is drunk. Tincture can also be taken	India	47
<i>Bambusa blumeana</i> Bl. ex. Schult. f. Novis (Graminae) ( <i>B. arundinaceae</i> F. Vill.)	<i>kauayan</i> , <i>kauayan-tinik</i> <i>kauayan-totoo</i> , spiny bamboo (Engl)	root	Decoction is drunk	India	33
<i>Bambusa vulgaris</i> Schrad. <sup>a</sup> (Graminae)	<i>kauayan-china</i> , <i>kauayan-kiling</i> , <i>taiu-anak</i> , <i>teuanak-kiling</i>	-	-	India	8
<i>Basella alba</i> Linn. (Basellaceae)	<i>alugbati</i>	root	Decoction is drunk	India	33
<i>Benincasa hispida</i> (Thumb.) Cogn. (Cucurbitaceae)	<i>kondol</i>	fruit	-	India	33
<i>Buddleia asiatica</i> Lour. (Loganiaceae)	<i>taliknono</i> , <i>malasambong</i> , <i>sambong-gala</i>	-	-	India	47
<i>Caesalpinia pulcherrima</i> (Linn.) SW (Leguminosae)	<i>bulaklak ng paraiso</i> , <i>caballero</i> , Flor de San Francisco, paradise flower, peacock flower, Barbados pride	leaf, seed	-	Paris	47

	whole plant	Juice is used by women to achieve temporary or permanent sterility	
<i>Caladium seguinum</i> Presl. (Araceae)		Juice is used by women to achieve temporary or permanent sterility	8
<i>Calotropis gigantea</i> (Willd.) Dryand ex. Ait. (Asclepiadaceae)	root, bark	Juice of the bark is given internally	8, 47
<i>Carica papaya</i> Linn. (Caricaceae)	seed	-	8, 47
<i>Carthamus tinctorius</i> Linn. <sup>a</sup> (Compositae)	-	-	47
<i>Carum roxburghianum</i> Benth. (Umbelliferae)	seed	Decoction is drunk	33
<i>Cassia alata</i> ex. C.B. Clarke Linn. <sup>a</sup> (Leguminosae)	leaf	Strong decoction is taken	47
<i>Cassia fistula</i> Linn. <sup>a</sup> (Leguminosae)	fruit	-	8, 33
<i>Celastrus paniculatus</i> Willd. <sup>a</sup> (Celastraceae)	root, leaf	-	8
<i>Cerbera manghas</i> Linn. <sup>a</sup> (Apocynaceae)	fruit	-	8, 17
<i>Chenopodium ambrosioides</i> <sup>a</sup> Linn. (Chenopodiaceae)	seed oil	Used as is	47
<i>Chrysanthemum indicum</i> Linn. (Compositae)	-	-	8

Table 1. (continued)

Scientific Name (Family)	Local Names (Merrill, 1926; Quisumbing, 1951).	Part Used	Method of Administration	Country	Reference
<i>Cissampelos pareira</i> Linn. (Menispermaceae)	<i>sinchao-sinchauan, gulagulamanan, sinsao-sinsaon, batang-batang, kala-kalamayan, makabo-o, sansau</i>	root	Decoction is drunk	India, Paraguay	8
<i>Citrus grandis</i> (Linn.) esb. <sup>a</sup> (Rutaceae)	<i>suha, lukban, grape-fruit, pomelo, shaddock</i>	—	—	India	8
<i>Citrus medica</i> Linn. (Rutaceae)	<i>bulid sidro</i> (Sp.)	fruit	Decoction is drunk	India	33
<i>Cleidon spiciflorum</i> (Burm. f.) Merr. (Euphorbiaceae)	<i>saligao, agipos, kayugkog, malagasaba, tayokan</i>	leaf	Decoction is drunk	Philippines	47
<i>Clerodendrum brachyanthum</i> Schaver. (Verbenaceae)	<i>kayomikom, mangha, talungud</i>	leaf	Decoction is drunk in large amounts	Philippines	47
<i>Cocos nucifera</i> Linn. (Palmae)	<i>niyog, coco</i> (Sp.) coconut (Engl.)	seed, fruit, juice	Milk is drunk. Juice of ripe or unripe fruit is drunk	Java Pacific Islands	8, 33
<i>Colubrina asiatica</i> Linn. Brongn. (Rhamnaceae)	<i>kabatiti, matitik</i>	fruit	Decoction is drunk	Malaya	47
<i>Cordia dichotoma</i> Forst. f. (Boraginaceae)	<i>anonang, sebastian plum soap berry</i>	fruit	Decoction is drunk	India	33
<i>Cratoxylon sumatranum</i> (Jack) Blume sap. blancoi (Blume) gog. (Guttiferae)	<i>gayong-guyong, kansilai, paguligin</i>	bark, leaf	Decoction is drunk	Philippines	47
<i>Crotolaria incana</i> Linn. (Leguminosae)	<i>latuc-latucan, patoc patocan, bulai latia</i>	flower, fruit	Chewed and eaten raw	Paraguay	8



<i>Crotolaria juncea</i> Linn. (Leguminosae)	Bengal hemp. Sunn hemp	root, leaf	—	India	33
<i>Croton tiglium</i> Linn. <sup>a</sup> (Euphorbiaceae)	<i>tubang-makaisa, tuba, kamaisa,</i> croton oil plant	root	Finely shredded and mixed with water and drunk	India, Java, Malay Peninsula	8, 47
<i>Cucumis sativus</i> Linn. <sup>a</sup> (Cucurbitaceae)	cucumber, <i>pipino</i>	—	—	India	8
<i>Daibergia ferruginae</i> Roxb. <sup>a</sup> (Leguminosae)	<i>batibagan</i>	wood	Decoction of wood of stem or root used as emenagogue and in large doses to induce expulsion of fetus	Philippines, West Indies	47, 32
<i>Datura metel</i> Linn. (Solanaceae)	<i>talampunai, talong-punai,</i> <i>trampunai, talong-punai na itim</i>	leaf, fruit	Decoction is drunk	India	33
<i>Daucus carota</i> Linn. (Umbellifera)	carrot, (Engl.) <i>remolacha</i> (Sp., Tag.)	seed	—	India	36
<i>Desmodium retroflexum</i> DC <sup>a</sup> (Leguminosae)	—	—	—	India	8
<i>Dolichandrone spathaceae</i> (Linn. f.) K. Schum. <sup>a</sup> (Bignoniaceae)	<i>tiwi, tua, tui</i>	—	—	India	47
<i>Entada scandens</i> Benth. (Leguminosae)	<i>gugo, balugo, bayogo, gogo,</i> <i>gugu</i>	seed	Eaten raw or roasted; taken in early morning on empty stomach	Australia	8, 32
<i>Euphorbia atoto</i> Forst. f. <sup>a</sup> (Euphorbiaceae)	<i>tairas, lamifigo</i>	sap	Milky juice is taken as an emenagogue and also as an abortifacient	India, Indo-China	47
<i>Euphorbia nerifolia</i> Linn. (Euphorbiaceae)	<i>soro-soro, sorog-sorog, bait</i>	root	Decoction is drunk	India	33

Table I. (continued)

Scientific Name (Family)	Local Names (Merrill, 1926; Quisumbing, 1951).	Part Used	Method of Administration	Country	Reference
<i>Euphorbia tirucalli</i> Linn. (Euphorbiaceae)	<i>suerda, konsuerda, consuelda</i> (Sp.), milk hedge, Indian tree spurge (Engl.)	—	—	India	8
<i>Excoecaria agallocha</i> Linn. (Euphorbiaceae)	<i>botabota, buta, buta-butua,</i> <i>lipatang buhai</i>	—	—	India	8
<i>Gmelina asiatica</i> Blco. <sup>a</sup> (Verbenaceae)	<i>alipung, alipunga, бага-бабуи</i>	—	—	India	8
<i>Gossypium hirsutum</i> Linn. var. (Malvaceae)	cotton plant	root	Decoction is drunk	South	8, 32
<i>Heliotropium indicum</i> Linn. <sup>a</sup> (Hydrophyllaceae)	<i>trompang elepante, buntot</i> <i>leon, higad-higaran, hinlalayon,</i> <i>kuting-kutingan, malakukuran,</i> <i>bigottitos, lengua de sapo,</i> <i>trompa elefante</i> (Sp.), Indian heliotrope, Ind. turnsole, erysipela plant (Eng.)	flower root	Decoction of dried roots is drunk	Indo-China Philippines	47
<i>Hibiscus abelmoschus</i> Linn. (Magnoliaceae)	<i>dalupang, kalupi, kastuli,</i> <i>kastio-kastogon, Musk-mallow</i> (Engl.)	flower	Infusion is drunk	Viti-Islands	8
<i>Hibiscus manihot</i> Linn. var. <i>pungens</i> Hochr. (Magnoliaceae)	<i>gigi, marakapas</i>	—	—	India	8
<i>Hibiscus rosa-sinensis</i> Linn. (Magnoliaceae)	<i>gumamela, antolangan</i> <i>tapolañgan, hibiscus, China rose</i> shoeflower	petals	The juice of the leaves is taken orally	India	8, 47, 33

<i>Hibiscus tiliaceus</i> sp. <i>tiliaceus</i> Linn. (Malvaceae)	<i>batibago, dalisi, malabago</i>	flower	Smoked with tobacco	Melanesia, Gulantuna	8
<i>Ipomoea nil</i> (L.) Roth [ <i>Ipomoea hederacea</i> (Linn.) Jacq. <sup>a</sup> ] (Compositae)	<i>kamokamotihan, bulakan,</i> <i>kaladanas</i> (Hindustan)	seed	—	China	45
<i>Jasminum multiflorum</i> (Burm. f.) Andr. (Oleaceae)	<i>sampaguita de China,</i> <i>sampaguitang-sunsong,</i> <i>sampaguita del Japon</i> (Sp.)	—	—	India	8
<i>Jatropha curcas</i> Linn. <sup>a</sup> (Euphorbiaceae)	<i>tubang bakod, kirisol, taba,</i> <i>kamaisa, tuba,</i> physic nut/tree, purging nut tree, big purge nut	seed, seed oil	Taken internally or rubbing of the seed oil on the abdomen	Cambodia	47

<sup>a</sup>Plants reported to have abortifacient action although some of them also produce antifertility effects.

Table II. Local Plants Tested for Antifertility Activity in Animals or Humans

Scientific Name (Family)	Common Name	Part/s Tested	Type of Extract*	Results	Ref.
<i>Abrus precatorius</i> Linn. (Leguminosae)	saga	leaves	P.E., EtOH, W	No antifertility activity in mice and rats	8
		seeds	Plant preparation P.E., EtOH W	No antifertility activity in female mice No significant anti-implantation activity in rats	41
		seeds	P.E.	Antifertility in mice and rats but toxic	8
		seeds	P.E.	Antifertility activity in mice and rats	8
		roots	P.E., EtOH	Prevention of nidation EtOH extract has anti-estrogenic activity	8
<i>Aloe barbadensis</i> Mill. (Liliaceae)	szabila	leaves	W	Antifertility activity in mice and rats	8
		fruit pulp,	W	No significant anti-implantation effect	14
		rhizomes, fruit	P.E., EtOH	Antifertility activity of P.E. and EtOH extracts in mice	8
<i>Annona comosus</i> (Linn.) Merr. (Bromeliaceae)	piña	unripe fruit	juice	Encouraging anti-implantation activity in rats	14
		leaves	sterol isolates	Significant antifertility activity of sterols IIa (5-stigmastene 3B, 7-diol)	46
<i>Annona squamosa</i> Linn. (Anonaceae)	artis	seeds	EtOH	Encouraging antifertility activity in rats at 200 mg/kg dose. Significant anti-implantation activity in rats	39

<i>Apium graveolens</i> Linn. (Umbelliferae)	kinchai	seeds	In ration	No inhibition of implantation	14
<i>Areca catechu</i> Linn. (Palmae)	bunga	fruit	P. E., EtOH, W	Inhibition of implantation with higher dose in rats	12
		whole plant,	W	Inactive in mice	8
		nuts	oils	Encouraging antifertility activity in rats 500 mg/kg dose	10
			Galenic preparation	33.3-38.7% anti-implantation effect when mixed w/ <i>Soraca indica</i> & <i>Cocus lacca</i> , Au and sugar	55
<i>Argemone mexicana</i> Linn. (Papaveraceae)	kachumba	stems and leaves	P. E., EtOH, W	No anti-implantation activity	4
<i>Aristolochia indica</i> Blanco (Aristolochiaceae)	timbang	roots	p-coumaric acid & aristolactum glucoside	100% Interceptive activity of p-coumaric acid on pregnant mice at 50 mg/kg	45
			aristolochic acid	0.075% aristolochic acid fed to male houseflies caused sterility	35
<i>Artabotrys odoratissimus</i> R. Br. (Anonaceae)	ilang-ilang de China	leaves	as is	Diestrus prolonged; degenerative changes in follicles of rats	8
			50% EtOH	Antifertility activity	44
			Benzene	Significant decrease in uterine glycogen of intact and ovariectom- ized rats. Increase in uterine total solids, non-protein N and total protein	
<i>Brucea amarissima</i> (now <i>B. javanica</i> (L.) Merr.) (Simarubaceae)	balanog	seed bark	EtOH —	100% reduction in litters of mice Anovulatory effect	8 8

Table II. (continued)

Scientific Name (Family)	Common Name	Part/s Tested	Type of Extract*	Results	Ref.
<i>Calotropis gigantea</i> (Wild.) Dry and ex. Ait. (Asclepiadaceae)	<i>kapal-kapal</i>	roots	P.E., EtOH, W	No inhibition of implantation in rats	26
<i>Carica papaya</i> Linn. (Cariaceae)	<i>papaya</i>	roots, stems, leaves, latex unripe fruit pulp	oil	Significant fetal loss	46
<i>Catharanthus roseus</i> (L.) G. Don (Apocynaceae)	<i>chichirica</i>	unripe fruit seeds leaves	P.E., EtOH, W P.E., EtOH, W vinblastine	Encouraging antifertility activity at a dose of 500 mg/kg in rats P.E. & EtOH extracts showed encouraging antifertility activity No antifertility activity	10 12 4
<i>Cassia fistula</i> Linn. (Leguminosae)	<i>fistula</i> , golden shower	fruits	50% EtOH	60% reduction in normal fetuses of rabbits at a dose of 0.3-0.5 mg/kg I.V.	3
<i>Citrus aurantium</i> Linn. (Rataceae)	<i>cajel</i> , <i>dalandan</i>	pericarp	citranin	Prolonged diestrus metestrus stages in virgin mature rats No pregnancies after several matings in rabbits	8
<i>Clitoria ternatea</i> Linn. (Leguminosae)	<i>pukinggan</i>	fruit	W	Decreased no. of litters in mice	8
<i>Costus speciosus</i> Elm. (Zingiberaceae)	<i>setawar</i>	rhizomes	Saponin mixture	Prevented pregnancy in 80% of rats when fed on days 1-7 of pregnancy at a dose of 50 µg/100	56
<i>Crotalaria juncea</i> Linn. (Leguminosae)	Bengal hemp	leaves, seeds	EtOH	The EtOH extract of the seeds produced 83.3% antifertility	49

<i>Curcuma longa</i> Linn. (Zingiberaceae)	<i>dilaw</i>	rhizomes	P.E., EtOH & W	effect in rats at a dose of 300 mg/kg given from days 1-7 of pregnancy	15
<i>Daucus carota</i> Linn. (Umbelliferae)	carrot	seeds	P.E., EtOH & W	Significant antifertility activity in rats	12
		seeds	P.E., EtOH and W	EtOH & W extracts showed encouraging antifertility activity	15
		seeds	oil	Significant antifertility activity	10
		seeds	EtOH	No significant antifertility activity at different doses	53
<i>Dendrocalamus strictus</i> F. Vill. (Graminae)	<i>kauayan-kiling</i>	leaves	P.E., EtOH and W	Estrogenic properties. Inhibition of implantation if given from days 4-6 post-coitum at 80 and 120 mg/kg mouse	8
<i>Dolichos biflorus</i> (Leguminosae)	<i>katil</i>	seeds	P.E., EtOH and W	No inhibition of implantation in rats at 100 mg/kg dose	11
<i>Gossypium herbaceum</i> Linn. var. arboreum (Malvaceae)	cotton plant	—	—	No antifertility activity	18
		seeds, stems, st. bark and root bark	P.E. EtOH and W	Inhibitory effects on implantations with important loss eggs in pregnant rats	14
		seeds, roots stems	gossypol	No anti-implantation activity at 100 mg/kg dose	42
				Inhibition of male rat fertility; damage to spermatids with increase in dosage duration of treatment numerous dead spermatozoa are observed until azoospermia.	

Table II. (continued)

Scientific Name (Family)	Common Name	Part/s Tested	Type of Extract*	Results	Ref.
<i>Grewia asiatica</i> Linn. (Tiliaceae)	<i>phalsa</i>	seeds	ditto	99.8% effective as an antifertility agent in men treated for 6 mos.	42
			oil	Encouraging antifertility activity at 500 mg/kg dose in rats.	10
		- ditto -	P.E., EtOH and W	40-66.6% inhibition of implantation in rats.	
<i>Hibiscus mutabilis</i> Linn. (Malvaceae)	<i>amapola</i>	flowers	C <sub>6</sub> H <sub>6</sub> extract	No significant effect on pregnancy	31
<i>Hibiscus rosa-sinensis</i> Linn. (Malvaceae)	<i>gumamela</i>	flowers	C <sub>6</sub> H <sub>6</sub> extract	C <sub>6</sub> H <sub>6</sub> extract of the flowers showed significant post coital antifertility activity in rats (Maximum during winter and minimum during summer)	31
			P.E., C <sub>6</sub> H <sub>6</sub> and EtOH	C <sub>6</sub> H <sub>6</sub> extracts showed 80% antifertility activity in female rats	2
		flowers	C <sub>6</sub> H <sub>6</sub>	C <sub>6</sub> H <sub>6</sub> and EtOH showed 83% and 50% post-coital antifertility activity in female rats	30
		shade-dried flowers	EtOH extract	Spermatogenesis in fertile rats was adversely affected at 150 mg and 250 mg/day doses. Testicular and pituitary weights of immature rats decreased	28
				No androgenic and antiandrogenic properties	28



<i>Hibiscus schizopetalus</i> (Mast) took f. (Malvaceae)	flowers	C <sub>6</sub> H <sub>6</sub>	No significant effect on pregnancy	31
<i>Fyptis suaveolens</i> (Linn.) Poir. (Labiatae)	leaves	P.E., EtOH and W	EtOH extract showed 100% antifertility activity at a dose of 125 mg/kg dose	11
<i>Jatropha curcas</i> Linn. (Euphorbiaceae)	fruit	in ration	Complete inhibition or reproduction in rats.	8
<i>Lawsonia inermis</i> Linn. (Lythraceae)	seeds	P.E., EtOH and W	No significant antifertility activity	4
<i>Leucaena leucocephala</i> (Lam.) de Wit. (Leguminosae)	leaves	Plant preparation called acerodhak leaf meal	Encouraging antifertility activity	41
			Prolonged estrous cycle length; complete inhibition of reproduction in mice and rats.	5
			Reduction of utero-ovarian weight in mice	5
			Significant decrease in testicular weight and inhibition of spermatogenesis in mice and rats.	5
<i>Leucas aspera</i> Link. (Labiatae)	whole plant	different extract	No significant post-coital anti- fertility activity in female rats.	30
<i>Luffa cylindrica</i> (Linn.) M. Poem (Cucurbitaceae)	whole plant	W	Decreased no. of litters in mice	8
<i>Mallotus philippensis</i> (Lam.) Muel Arg. (Euphorbiaceae)	trichomes	In ration	Reduction in fertility rate in rats and guinea pigs Disturbance in the estrous cycle. Reversible effect.	20

Table II. (continued)

Scientific Name (Family)	Common Name	Part/s Tested	Type of Extract*	Results	Ref.
		trichomes	rotterlin	100% antifertility effect at 10 mg/kg in a 10-day and 84% effective in a 20-day period. 100% infertility rate resulted with 20 mg/kg dose	20
		seeds	P.E., EtOH and W	No activity in mice and rats	8
<i>Melissa officinalis</i> Linn. (Labiatae)		whole plant	W	Antigonadotrophic effect in rats	8
<i>Mentha arvensis</i> Linn. (Labiatae)	<i>hierba buena</i> peppermint	leaves	P.E., EtOH & W	EtOH extract showed 100% anti-fertility activity in female rats	4
		whole plant		Significant antifertility activity in female rats	53
		whole plant		No significant antifertility activity	30
		whole plant	(Water soluble fraction) 1st chromatographic fraction	Interruption of pregnancy in rats when given from days 1-10.	24
		roots	P.E., EtOH and W	Pronced post-implantation effect	24
<i>Mitchelia champaca</i> Linn. (Magnoliaceae)	<i>tsampaca</i>			No inhibition of implantation	8
<i>Mimosa pudica</i> Linn. (Polygonaceae)	<i>makahiya</i>	leaves	unknown extract	At 100-250 mg/kg body wt., abortifacient activity was shown in rats.	40

<i>Momordica charantia</i> Linn. (Cucurbitaceae)	<i>ampalaya</i> bitter gourd	fruit	unknown extract	Impaired fertility due to testicular lesions in dogs resulting in a mass atrophy of the sperma- togenic elements.	6
<i>Moringa oleifera</i> Lam. (Moringaceae)	<i>malunggay</i>	leaves	water	No antifertility activity in female rats at 250-500 mg/day	50
<i>Nicotiana tabacum</i> Linn. (Solanaceae)	<i>tabako</i> tobacco	bark leaves -- ditto --	not specified smoking nicotine	No significant antifertility activity  Alters ovarian cycle in humans. Increase in no. of still- born in rats.	49 8
<i>Ocimum sanctum</i> Linn. (Labiatae)	<i>sulasi</i> sacred basil	not specified	P.E., C <sub>6</sub> H <sub>6</sub> ether acetone and EtOH	C <sub>6</sub> H <sub>6</sub> and P.E. extracts showed 80% and 60% antifertility activity respectively in female rats. Other extracts inactive	2
<i>Peperomia pellucida</i> (Linn.). HBK. (Piperaceae)	<i>ulasiman-bato</i>	leaves	in ration	Slight impairment of spermatogenesis in mice. Failure in male mice to fertilize normal female mice of proven fertility	25
<i>Phaseolus aureus</i> Roxb. (Leguminosae)	<i>mongo</i>	leaves stems	water	43-50% reduction of litters in mice	8
<i>Piper betle</i> Linn. (Piperaceae)	<i>ikmo</i> , betel leaf pepper	whole plant leaves	water P.E., EtOH and W	Decreased no. of litters in mice, postcopulating activity  Inactive in mice and rats	8 8
<i>Piper longum</i> Linn. (Piperaceae)	<i>litlit</i>	fruit	P.E., MeOH, C <sub>6</sub> H <sub>6</sub> , CHCl <sub>3</sub>	C <sub>6</sub> H <sub>6</sub> extract exhibited 57% inhibitory activity while the CHCl <sub>3</sub> extract showed 50% activity. P.E. and MeOH extracts	27

Table II. (continued)

Scientific Name (Family)	Common Name	Part/s Tested	Type of Extract*	Results	Ref.
				revealed only marginal activity in fertile female rats	
			Ayurvedic prep. composed of <i>Piper longum</i> , <i>Embelia ribes</i> and borax	Prolonged estrous phase of vaginal cycle in rats & guinea pigs. Enhanced alkaline phosphatase activity in uterus of treated animal	21
		fruit	as is dried and powdered	Marginal antifertility activity in fertile female rats	27
		fruit	as is	Prep. called Lajjal composed of the fruit, $As_2S_3$ , jawarai masta and borax failed to show any antifertility activity	47
		fruit	various extracts	P. E. extract produced no marked post-coital antifertility activity in rats	43
			piperine, waxy alkaloid	Waxy alkaloid showed significant anti-implantation, early abortifacient activity	43
<i>Piper nigrum</i> Linn. (Piperaceae)	<i>paminta</i> , pepper	fruit	various extracts	All extracts showed marked post-coital antifertility activity	43
<i>Piper officinarum</i> C. DC. (Piperaceae)	<i>litlit</i>	fruit	various extracts	Activity not marked in P. E. extract	43
<i>Pisum sativum</i> Linn. (Leguminosae)	<i>chicharo</i> , pea	seed oil	m-xylohydroquinone	Reduction in relative no. of pregnancies in humans when given orally on the 16th and 21st day of the cycle.	8

seed	in ration	20% in the diet of rats decreased litter formation while 30% stopped litter formation	8
- ditto -	- ditto -	Decreased rat fertility	8
- ditto -	oil	IM injection once a month postponed pregnancy in humans	8
- ditto -	m-xylohydroquinone	Reduction in no. of pregnancies in humans when given orally	52
roots	P.E., EtOH, and W	No inhibition of implantation in rats	8
roots	P.E., EtOH, and W	EtOH extract showed significant antifertility activity in female rats	53
- ditto -	various chromatographic fractions of alcohol ext.	P.E., P.E. + C <sub>6</sub> H <sub>6</sub> 1:1 and C <sub>6</sub> H <sub>6</sub> + CHCl <sub>3</sub> 1:1 eluates prevented pregnancy in 8/10, 6/10, 6/10 and 6/10 albino rats resp. No activity of other fractions	13
whole plant	in ration	A dose of 1 g/day impaired fertility in mice and a dose of 9 g/day produced sterility in female guinea pigs	7
-	-	No anti-ovulatory, antizygotic anti-implantation or abortifacient activity has been mentioned	27
roots	EtOH	Encouraging antifertility activity	27
pericarp	in ration	Reduced fertility rate in rats and guinea pigs. Estrous cycle	8

*Plumbago zeylanica* Linn.  
(Plumbaginaceae)

*Polygonum hydropiper* Linn.  
(Polygonaceae)

*Punica granatum* Linn.  
(Punicaceae)

Table II. (continued)

Scientific Name (Family)	Common Name	Part/s Tested	Type of Extract*	Results	Ref.
<i>Randia dumetroum</i> Lam. (Rubiaceae)	<i>mankit</i>	fruits	P.E., EtOH, W	was disturbed so that animals failed to mate. Mating resulted in pseudo-pregnancies. No anti-implantation activity in rats	26
		fruits	EtOH	No anti-implantation activity in rats but marked anti-ovulatory effect in rabbits	57
<i>Raphanus sativus</i> Linn. (Cruciferae)	<i>labanos</i> , raddish	whole plant	water	Decreased no. of litters in mice	8
<i>Ricinus communis</i> Linn. (Euphorbiaceae)	<i>tangan-tangan</i> castor oil plant	seeds	various extracts	No significant post-coital antifertility activity	28
	<i>tangan-tangan</i> castor oil plant	seeds	oil	No significant antifertility activity at different doses	10
		seeds	P.E., EtOH, W	All extracts showed no anti-implantation activity	12
<i>Rosmarinus officinalis</i> Linn. (Labiatae)	<i>romero</i>	whole plant	water	Antigonadotrophic effect in rats	8
<i>Semecarpus anacardium</i> Blco. (Anacardiaceae)	<i>ligas</i>	seeds	P.E., EtOH, W	No anti-implantation activity in rats	26
<i>Sida carpinifolia</i> Linn. f. (Malvaceae)	<i>eskobang-haba</i> <i>ualisualisan</i>	whole plant	MeOH, P.E. and CHCl <sub>3</sub>	MeOH extract of whole plant altered normal estrous cycle in rats and prevented pregnancy. P.E. and CHCl <sub>3</sub>	29

<i>Taxus baccata</i> Merr. (Taxaceae)	stems	P.E., EtOH W	extracts showed no significant effects	26
	leaves	P.E., EtOH W (column chromatographic fractions)	No anti-implantation activity	9
	leaves	P.E., EtOH	Fractions 1 and 13 inhibited pregnancy in 60% of rats while fractions 2, 4 and 8 produced partial or complete resorption at term	14
<i>Terminalia catappa</i> Linn. (Combretaceae)	—	—	60% infertility in rats with P.E. and water extracts	8
<i>Triphena portulacastrum</i> Linn. (Aizoceae)	roots	—	Antifertility effect	49
			No significant post-coital antifertility activity	39
<i>Urvaria lagopodioides</i> (Linn.) Desv. ex. DC. (Leguminosae)	whole plant	P.E., EtOH,	No significant anti-implantation activity	26
			Encouraging anti-implantation activity	

\*Type of extract — P.E. — petroleum ether, C<sub>6</sub>H<sub>6</sub> — benzene, CHCl<sub>3</sub> — chloroform, MeOH — methanol, EtOH — ethanol, W — water.