

Botanical Galactagogues

**Kathy Abascal, B.S., J.D., R.H. (AHG),
and Eric Yarnell, N.D.**

Abstract

Herbs have a long history of use in all cultures to stimulate milk production both in women and in dairy animals. It is estimated that about 15% of breastfeeding women in the United States have used botanical galactagogues. This article discusses some of the herbs commonly used as galactagogues and also makes some suggestions on how studies might be conducted to bridge the gap between common uses and lack of studies on the safety and effectiveness of these herbs in lactation.

Coverage in this article includes *Trigonella foenum-graecum* (fenugreek) seed, *Galega officinalis* (goat's rue) herb, *Foeniculum vulgare* (fennel) seed, *Vitex agnus-castus* (chaste tree) seed, *Epilobium* spp. (fireweed) herb, *Pimpinella anisum* (anise) seed, *Cnicus benedictus* (blessed thistle) herb, *Silybum marianum* (milk thistle) herb, *Urtica dioica* (stinging nettle) herb, and *Gossypium* spp. (cotton) root.

Introduction

Herbs have a long history of use in all cultures to stimulate milk production both in women and in dairy animals. The importance of breastfeeding human infants and the need for clinicians to help patients with delayed or insufficient milk production are both well-established. Herbal galactagogues are widely used today but there is a significant disconnect between usage and support for that use from conventional health care practitioners. This article discusses some of the herbs commonly used as galactagogues and also makes some suggestions on how studies might be conducted to bridge the gap between common uses and lack of studies on their safety and effectiveness in lactation.

Lactation Physiology and Conventional Medicine

The mammary glands develop extensively during pregnancy but secretion is held in check by high circulating levels of progesterone. This is referred to as lactogenesis I. Lactogenesis II takes place after delivery, usually 30–40 hours after the delivery of a full-term infant. Once the placenta is expelled, progesterone levels decline rapidly and increasing prolactin levels trigger the onset of milk secretion. Oxytocin is essential to milk removal from the breast and is raised by the sensory stimulation of infant suckling. Other hormones vital to lactogenesis II are insulin, which makes nutrients more available for milk synthesis, and thyroid hormone, which appears to be necessary for mammary responsiveness to growth hormone and prolactin during lactation.¹

Social and psychologic factors also strongly influence a mother's ability to nurse. Other common causes of insufficient milk production include diabetes, hypothyroidism, obesity, theca-lutein cysts, and polycystic ovarian syndrome (PCOS).

There are no specific diagnostic tests for lactation sufficiency. One study showed that the maternal perception of insufficiency is a valid indicator of delayed lactogenesis II. Conventional treatments include mechanical breast pumping and the use of either metoclopramide or domperidone (see box on Pharmaceutical Galactagogues). Although many conventional practitioners recommend against using herbal galactagogues because they have not been sufficiently studied in infants, it is estimated that at least 15% of breastfeeding women use herbal galactagogues at some point.²

Many of these conventional practitioners agree that these botanicals should be studied, but disagreement exists on how this might be done. Identified problems include fear that survey participants given a list of herbs used as galactagogues



Trigonella foenum-graecum (fenugreek).

might decide to try those herbs. Katherine Shealy, M.P.H., of the National Center for Chronic Disease Prevention and Health Promotion, wrote:

Some of the as-of-yet unresolved issues include surveillance dilemmas such as ethical and logistical issues. There is discomfort in including a list that may be seen as recommended items for breast-feeding mothers, especially given that some of the items FDA [Food and Drug Administration] wishes to include would be included because of safety concerns, such as star anise. In fact, in cognitive testing, mothers looked over the list and said things like "Oh! I didn't know these were for breast-feeding! Maybe I should try these!" Beyond the specific potential risk of some items included in the list, other items were included that are widely acknowledged to inhibit lactation. This poses the ethical problem of leaving a mother thinking that anything on that list is good for breast-feeding.³

Other issues include differences of opinion in researchers who create surveys as to what should be included with some recommending that only "dangerous" items should be includ-

A long use of a plant as a food infers a higher degree of safety than does only use as a medicinal.

ed, while other researchers say that that only "effective" items should be included. In both cases, researchers do not know which items are indeed dangerous or effective.³

As botanical practitioners, we recommend that the extensive use of a remedy needs to be factored into any analysis, as does the fact that a long use of a plant as a food infers a higher degree of safety than does only use as a medicinal. The end of this article will return to the issue of how to study these herbs best.

Botanical Galactagogue Formulas

Mother's Milk Blend Tea*

This consists of:

- Dried *Matricaria recutita* (chamomile) flowers
- Dried *Nepeta cataria* (catnip) herb
- Foeniculum vulgare* (fennel) seeds
- Dried *Urtica dioica* (stinging nettle) herb
- Dried *Lavendula* spp. (lavender) flowers.

This is an infusion, dosed up to four times a day.

More Milk Plus†

This is a tincture blend of:

- Trigonella foenum-graecum* (fenugreek) seed
- Cnicus benedictus* (blessed thistle) herb
- Urtica dioica* (stinging nettle) leaf
- Foeniculum vulgare* (fennel) seed

Proportions were not stated in the source. Dose should be 1/4 tsp (1 mL) 4 times per day with 1–2 ounces of fluid. Patient should avoid additional liquids 20 minutes before and after each dose.

Mother's Lactaflow‡

This is a tincture blend of:

- Foeniculum vulgare* (fennel) seed
- Cnicus benedictus* (blessed thistle) herb
- Galega officinalis* (goat's rue) herb
- Trigonella foenum-graecum* (fenugreek) herb

Proportions were not stated in the source. The dose should be 30–40 drops 3–4 times per day.

*Romm A. Naturally Healthy Babies and Children. Pownal, VT: Schoolhouse Road, 2000.

†Online document at: Motherlove® Herbal Company www.motherlove.com/product_more_milk_plus.php Accessed September 20, 2008.

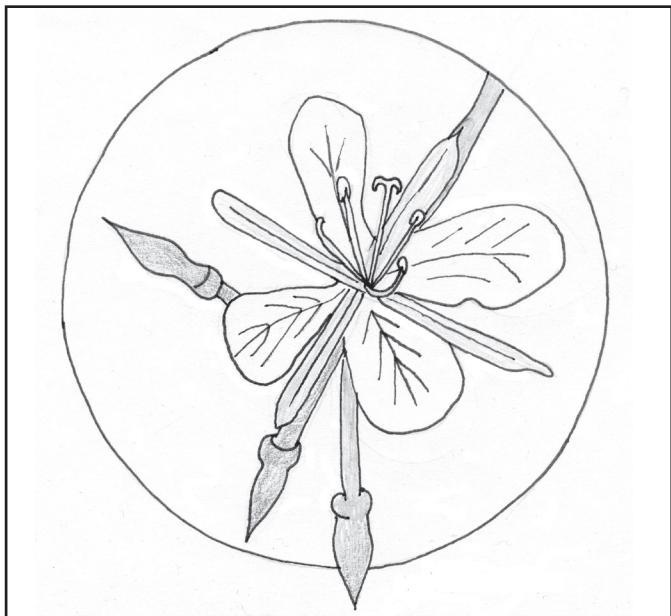
‡Wise Woman Herbals. Online document at: www.wisewomanherbals.com Accessed September 20, 2008.

Herbs as Galactagogues

Fenugreek Seed

Trigonella foenum-graecum (fenugreek) appears to be the herb used most often today as a galactagogue. Despite this widespread use, there is little research on the effectiveness of this remedy. Furthermore, no research has been done on the pharmacokinetics of the herb to determine to what extent its constituents are transmitted by the mother's milk to the infant or on the safety of such constituents in a newborn. While the scientific data are sparse, there are many anecdotal reports on the internet about the use of fenugreek.

One interesting article by Rima Jensen, M.D., describes her personal use of the plant.⁴ When Dr. Jensen's milk production dropped below the demands of her third child, she began taking



Two views of *Epilobium angustifolium* (fireweed).

fenugreek. It worked so well that she also used the herb while nursing her fourth child. She wrote: "With fenugreek, there is enough milk even with [feedings every 3-to-4 hours]."

She found that taking three capsules a day was insufficient but doubling the dose to take three capsules twice daily was adequate. At one point, she took 15 capsules at once, and this caused moderate breast engorgement about 36 hours later. In addition, Dr. Jensen referenced an Egyptian study done in 1945 that purportedly increased milk production by up to 900%, but we were unable to obtain a copy of the original study.⁴ Other writers have said that fenugreek may be able to initiate lactation in the mother of a recently adopted infant.⁵

Although the leaves of the plant are eaten as a food, the dried seeds are commonly used as a cooking spice and as medicinals. Fenugreek's primary uses are to treat loss of appetite, to address weight loss, and as a poultice for a variety of skin inflammations. This herb was a main ingredient in Lydia Pinkham's Vegetable Compound, a very popular woman's tonic during the late 1800s. There are also descriptions of its use to increase milk production in cows.⁴ In Ethiopia, the seeds are used to prepare a milk substitute for infants. The seeds are also used today to provide flavor in artificial maple syrup. They are rich in mucilage and contain steroid saponins such as diosgenin as well as small amounts of an alkaloid (trigonelline). The seeds have a bitter taste and a characteristic smell that can be carried into the urine.

Studies have done some work to investigate fenugreek's ability to ameliorate various aspects of diabetes and its action as an antidiabetic, inflammation modulator, and lipid reducer. In rats, the seed lowered the concentration of testosterone and luteinizing hormone.⁶ In vitro, fractions of the alcoholic extract produced a antihistaminic action on isolated ileum, an anticholinergic action on isolated colon, and a stimulant effect on isolated uterus.⁷ Other studies showed the seeds to have some type of antidepressant activity in animals; in rats, this effect was equal to



that of the drug imipramine.⁸ In another study, the seeds produced nootropic and anxiolytic activity in mice.^{9,10}

This herb's actions on the liver appear to be positive. A fenugreek extract had a positive action on both lipid profile as well as collagen accumulation in animals with induced-alcoholic liver disease. This effect was comparable to the silymarin complex derived from *Silybum marianum* (milk thistle) seed.¹¹ In diabetic animals, the alcoholic extract of the seeds (0.1–05 g/kg body weight) alleviated weight loss, and reduced blood glucose levels, total cholesterol, urea, creatinine, and liver enzymes. The herb's effect was considered to be equivalent to that of the drug glibenclamide.¹² In deoxycorticosterone acetate-salt- and fructose-induced hypertensive rats, a methanol extract of the seeds had a significant antihypertensive effect.¹³

In perimenopausal women, 6 g per day of fenugreek powder decreased hot flashes and vasomotor symptoms but with a less-pronounced effect than hormone replacement therapy (HRT; conjugated estrogen and medroxy progesterone acetate).¹⁴ Other miscellaneous effects reportedly include an ability to treat low-to-moderate hair loss in both men and women as well as the ability to stimulate hair growth.¹⁵

Few adverse effects have been noted for fenugreek. This is to be expected, as it has a long history of use as a spice and a food. Rabbits fed fenugreek as 30% of their diet had increased progesterone levels, antifertility effects in females, and reduced fetal and placental weights. In male rabbits, damage to seminiferous tubules and reduced testis weight was observed.¹⁶

Although this not a negative effect per se, women who ingest fenugreek during labor may cause their infants to exude a scent that can be confused with maple syrup urinary disease.¹⁷

Fenugreek is generally considered safe although it is contraindicated in pregnancy.¹⁸ The German Commission E approved this herb's internal use for loss of appetite and external use for local inflammation, and described fenugreek as a

secretolytic agent.¹⁹ It has been, and continues to be, widely used, as an aid in lactogenesis with only sporadic claims of minor adverse effects (e.g., digestive upset, diarrhea, mild allergic reactions) that are reversed on dose reduction or cessation of taking the herb. As mentioned above, studies show fenugreek to have potential as an anxiolytic and antidepressant. Given that anxiety is often part of the problem in insufficient milk production, these aspects of the plant may have a role in its use as a galactagogue as well. The recommended dose of fenugreek as a single herb to promote milk production is a 1200-mg capsule 2–3 times daily.

Goat's Rue Herb

Another common galactagogue is *Galega officinalis* (goat's rue) herb. It is generally prescribed as a tea and is described as being most effective when made from the fresh plant,²⁰ although this herb is most frequently used as a dried plant. Goat's rue was used historically to increase milk yield,²¹ and

an 1873 communication to the French Academy reportedly showed that this herb could increase milk production in cows by 35%–50%.²⁰ It is widely used in folk medicine to treat diabetes and as a galactagogue.²²

Goat's rue also has a long history of use for symptoms now ascribed to non-insulin resistant diabetes. Several of this plant's constituents (guanidine and galegine) were stud-

Goat's rue was used historically to increase milk yield.

ied as antidiabetic agents. One of the most widely antidiabetic drugs, metformin, is a synthetic chemical based on galegine.²³ Metformin is considered safe for use in pregnancy and in lactation.

Pharmaceutical Galactagogues

Two drugs are prescribed as galactagogues in the United States, Canada, and Europe: Reglan (metoclopramide) and Nauzelin (domperidone).

Metoclopramide

Metoclopramide is prescribed off-label as a lactation aid. It is approved for use in gastric reflux, and data show that this agent increases prolactin levels. One of the most troublesome side-effects of the drug is depression. "Mental depression has occurred in patients with and without prior history of depression. Symptoms have ranged from mild to severe and have included suicidal ideation and suicide."* This is particularly troublesome because of the ever-present risk that new mothers often experience postpartum depression.

Extrapyramidal symptoms occur in about 1 in 500 patients at usual adult doses. These symptoms occur more frequently in children and young adults and are more frequent at higher doses. Symptoms include involuntary movements of limbs and facial grimacing, torticollis, oculogyric crisis, rhythmic protrusion of tongue, bulbar type of speech, trismus, or dystonic reactions resembling tetanus. Other side-effects are irreversible tardive dyskinesia and neuroleptic malignant syndrome.*

This drug is secreted in human milk and its safety in infants has not been established. Neonates are less able to clear the drug from their systems, and dystonias and other extrapyramidal reactions are more common in the pediatric population than in adults.*

In one study, the use of metoclopramide combined with training in breastfeeding was no more effective than training alone.[†] Another study found metoclopramide to be a safe and effective galactagogue.[‡]

Domperidone

Domperidone has not been approved for use by the Food and Drug Administration (FDA). This agent is, however, used as a galactagogue in other countries. Many people argue that it has not been approved for political reasons and that it is a far safer galactagogue than metoclopramide.[§]

In one study, domperidone failed to increase milk production in one third of the mothers of preterm infants. The amount of the drug transferred to infants in the milk was low and deemed insignificant.[¶] It is a poorly studied antidopaminergic agent that, nonetheless, is considered to be compatible with breastfeeding by the American Academy of Pediatrics.^{||}

The FDA warns against use of this drug based on case reports of cardiac arrhythmias and deaths associated with high doses of intravenous (I.V.) domperidone. Oral doses are said to be 80–150 times lower than the I.V. doses. Scientific data supports its use as a galactagogue at a dose of 30 mg per day for a week. Typically, this drug is administered at 30–90 mg per day for up to 8 weeks.^{||}

*NDA 21-273, page 4. Trade Name (metoclopramide orally disintegrating tablets). Online document at: www.fda.gov/cder/foi/label/2005/021793lbl.pdf Accessed September 19, 2008.

[†]Sakha K, Behbahan AG. Training for perfect breastfeeding or metoclopramide: Which one can promote lactation in nursing mothers? *Breastfeeding Med* 2008;3:120–123.

[‡]Toppore MF, Laleli Y, Senses DA, et al. Metoclopramide for breast milk production. *Nutr Res* 1994;14:1019–1029.

[§]Official Statements From Prominent Physicians. *Breastfeeding Online*. Online document at: www.breastfeedingonline.com/OfficialDomStatements.shtml September 19, 2008.

[¶]Wan EW-X, Davey K, Page-Sharp M, et al. Dose-effect study of domperidone as a galactagogue in preterm mothers with insufficient milk supply, and its transfer into milk. *Br J Clin Pharmacol* 2008; 66:283–289.

^{||}Ruddock B. Domperidone and lactation. *Can Pharmaceut J* 2005;138:28–29.

In rats, the LD₅₀ of the plant exceeds 5 g per kilo. In a study that examined subchronic toxicity of goat's rue in rats, it was noted that the herb decreased calcium, albumin, hematocrit, white blood cell counts, and platelet counts when fed to the rats as 0.15 to 3% of their diet. Goat's rue also produced some negative histologic effects on liver and lung tissue.²² Other studies showed that goat's rue extract inhibited platelet aggregation,²⁴ had significant antibacterial action in vitro,²⁵ and, as 10% of a diet, caused significant weight loss in normal and genetically obese mice.²⁶

The German Commission E denied approval of the use of goat's rue as a diuretic, as a supportive therapy in diabetes, and as a galactagogue because the effectiveness for the claimed application was not documented.¹⁹ Nonetheless, the renowned phytotherapist and M.D., Rudolf Weiss, considered goat's rue to be an "effective and safe lactagogue, increasing not only the volume of milk, but also the proportion of milk solids, so that it is not a matter of diluting the milk, but a genuine increase in production."²⁷ The recommended dose of goat's rue is 1 tsp of dried herb steeped in 1 cup of water twice daily or 1–2 mL of tincture three times daily.

Fennel Seed

Foeniculum vulgare (fennel) has been shown to increase milk production in goats.²⁰ This herb has been used for a very long time as a galactagogue in humans.

Fennel is often combined with other herbs to soothe colic in infants. One study examined the combined effect of fennel, *Matricaria recutita* (chamomile) flowers, and *Melissa officinalis* (lemon balm) herb on the upper gastrointestinal (GI) transit in mice. The combination, and chamomile and lemon balm separately, significantly inhibited transit time indicating a potential benefit in colic.²⁸ In colicky, breastfed infants, this herbal blend relieved colic within 1 week of treatment.²⁹ Of course, the fact that the herb can be administered directly to colicky babies should overcome most concerns that constituents possibly transmitted in breast milk might pose a safety issue.

In rabbits, an aqueous extract of fennel as eye drops significantly reduced ocular hypertension (about 31%) in acute and chronic models of glaucoma.³⁰ In vitro, an aqueous extract of fennel had an antimicrobial action against human pathogens equal to, or better than, standard antibiotics.³¹ Fennel tea is a good source of minerals.³² Fennel improved cognitive function in animal models of dementia.³³ Similarly, an emulsion of fennel-seed oil reduced colic in infants compared with placebo.³⁴ This herb has also benefited young women who had primary dysmenorrhea.³⁵

Administration by gavage of an aqueous extract of fennel reduced the fertility of female mice in one study,³⁶ but showed no significant effects in a toxicity study in mice with the exception of weight gain in male mice.³⁷ The German Commission E has approved the use of fennel seed for mild dyspepsias and

catarrh of the upper respiratory tract in children.¹⁹ The recommended dose is 5–7 g of seed as a tea per day.

Chaste Tree Seed

Vitex agnus-castus (chaste tree) is another widely used herbal galactagogue.³⁸ It belongs to the verbena family, and, in South America, various species of verbenas are used similarly.

Chaste tree has been most widely studied in premenstrual syndrome, in which the herb reduces symptoms such as mastodynia assumed to be due to hyperprolactemia.^{39,40} The German Commission E has approved chaste tree as a treatment for these disorders.¹⁹ Thus, it may seem contradictory that the plant is also used as a galactagogue for which the objective is often to increase or, at the very least, not decrease, prolactin levels. In fact, some researchers recommend, based on this herb's effect on premenstrual syndrome (PMS) that chaste tree be avoided in lactation.⁴¹

Human studies have shown that chaste tree reduces prolactin levels in women with hyperprolactemia.⁴² However, some animal studies have suggested that the herb may have a moderating rather than a suppressive effect on prolactin levels. In one mouse study, orally administered chaste tree significantly increased prolactin levels, compared with controls.⁴² Dr. Weiss referred to an early German study that showed that a proprietary extract of chaste tree (Agnolyt,™ Madaus AG, Cologne, Germany) improved breastfeeding in women, compared with controls. The extract purportedly enabled the women in the study's treatment group to "maintain a good level of milk production, without having to fear harmful side effects."²⁷

Chaste tree also tends to improve mood in premenstrual syndrome and, in one study, was as effective as fluoxetine in patients with premenstrual dysphoric disorder (*DSM-IV**).⁴³ Finally, a recent study showed that chaste tree can reduce or control epileptic seizures in rats.⁴⁴

Chaste tree is generally considered very safe with few side-effects noted in clinical trials. Its use in pregnancy is generally contraindicated although the herb is sometimes prescribed to avoid miscarriages in early pregnancy.¹⁷ The recommended dose of chaste tree is 1 tsp of the berries steeped in 1 cup of water 3 times daily or 2.5 mL of tincture three times per day.

Botanical Galactagogues and Science

Many other herbs are used to stimulate milk production. Most have long histories of traditional use, and many were used to stimulate milk production in animals. One example is *Epilobium* spp. (fireweed) herb, which is used as food and also used as a galactagogue. Its Swedish common name, *mjölkelse* (milk), is derived from the herb's use to stimulate milk production in cows.

None of these herbs—which include *Pimpinella anisum* (anise) seed (a close relative of fennel), *Cnicus benedictus* (blessed thistle) herb, milk thistle herb, *Urtica dioica* (stinging nettle) herb, and *Gossypium* spp. (cotton) root—have been studied to determine how well they stimulate lactation; nor has their

*American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th ed. American Psychiatric Association, Washington, DC, 1994.

safety in lactation been shown the attention it deserves, although there is at least some preliminary evidence supporting the utility of these herbs.⁴⁵ Nonetheless, as shown in the box, Botanical Galactagogue Formulas, these herbs are common ingredients in herbal formulas used by many lactating women.

Breastfeeding is an important facet of developing healthy children, and society's failure to study commonly used remedies that may be both safe and effective is unacceptable. It is also unacceptable for health care practitioners to simply recommend that these plants not be used because safety data are lacking without, at the same time, demanding that appropriate studies be funded.

At first, it might seem unethical to expose infants to potentially harmful herbal galactagogues in randomized blinded studies. And perhaps it is asking too much to suggest that historical uses as food and galactagogue be accredited value in providing a preliminary showing of safety. However, these herbs could easily be tested first in dairy animals in whom it would be easy to measure milk production and assess safety.

Another alternative, given that at least 15% of lactating women are using these herbs, is to do studies designed in the manner of an early studies on *Tanacetum parthenium* (feverfew). In that study, the researchers simply advertised for migraine sufferers who already were taking feverfew.⁴⁶ After surveying participants who responded, this double-blind, placebo controlled study was designed, bypassing animal studies. If similar studies of lactating women were initiated, we would soon have sufficient data to evaluate safety and preliminary effectiveness of these plants.

Conclusion

Given the importance of adequate breastfeeding of infants, and the increase in obesity and PCOS that often interfere with lactogenesis II, studies should be made a high priority. In the meantime, given the long history of use of these galactagogues and the wealth of anecdotal support for their effectiveness, we feel that women, under the guidance of a midwife or professional trained in monitoring lactation issues, should feel entirely comfortable taking these herbs.

References

- Hurst NM. Recognizing and treating delayed or failed lactogenesis II. J Midwifery Women Health 2007;52:588–594.
- Use of Herbal Products in Pregnancy, Breastfeeding, and Childhood Workshop. The National Children's Study, December 16, 2003. Online document at: www.nationalchildrensstudy.gov/research/workshops/Pages/herbal_122003.aspx September 19, 2008.
- Shealy K. Herbal and Dietary Supplement Use During Lactation. Sub-section in: Use of Herbal Products in Pregnancy, Breastfeeding, and Childhood Workshop. The National Children's Study, December 16, 2003 Online document at: www.nationalchildrensstudy.gov/research/workshops/Pages/herbal_122003.aspx Accessed November 5, 2008.
- Jensen R. Fenugreek: Overlooked But Not Forgotten. Online document at: www.breastfeedingonline.com/fenugreekoverlooked.shtml September 19, 2008.
- Fleiss P. Herbal remedies for the breastfeeding mother. Mothering 1988; Summer:68–71.
- Mokhtari M, Shariati M, Gharamanie R. Effect of *Trigonella foenum-graecum* L. seed extract on concentration of testosterone and spermatogenesis in rats. J Med Plants 2008;7:12–20;127.
- Natarajan B, Dhananjayan R. Pharmacological effects of *Trigonella foenum-graecum* Linn. seeds on various isolated perfused smooth muscle preparations. Pharmacognosy Mag 2007;3:77–82.
- Pawar VS, Hugar S, Gawade B, Patil RN. Evaluation of antidepressant like activity of *Trigonella foenum graecum* Linn. seeds in mice. Pharmacologyonline 2008;1:455–465.
- Mohan M, Banekar A, Birdi T, et al. Nootropic and anxiolytic activity of fenugreek seeds. J Nat Remedies 2006; 6:153–156.
- Iyer M, Betapurkar H, Sherikar O, Kasture SB. Anxiolytic activity of *Trigonella foenum-graecum* seeds. J Nat Remedies 2004;4:61–65.
- Kaviarasan S, Viswanathan P, Anuradha CV. Fenugreek seed (*Trigonella foenum graecum*) polyphenols inhibit ethanol-induced collage and lipid accumulation in rat liver. Cell Biol Toxicol 2007;23:373–383.
- Eidi A, Eidi M, Sokhteh M. Effect of fenugreek (*Trigonella foenum-graecum* L) seeds on serum parameters in normal and streptozotocin-induced diabetic rats. Nutr Res 2007;27:728–733.
- Balaraman R, Dangwal S, Mohan M. Antihypertensive effect of *Trigonella foenum-graecum* seeds in experimentally induced hypertension in rats. Pharamaceut Biol 2006;44:568–575.
- Hakami S, Mohammed Alizadeh S, Delazar A, et al. Probable effect of fenugreek seed on hot flash in menopausal women [in Farsi]. J Med Plants 2006;5:9–14; 65.
- Schulz C, Bielfeldt S, Reimann J. Fenugreek + micronutrients: Efficacy of a food supplement against hair loss. Kosmetische Medizin 2006;27:176–179.
- Kassem A, Al-Aghbari A, Al-Habori M, Al-Mamary M. Evaluation of the potential antifertility effect of fenugreek seeds in male and female rabbits. Contraception 2006;73:301–306.
- Korman SH, Cohen E, Preminger A. Pseudo-maple urine disease due to maternal prenatal ingestion of fenugreek. J Paediatrics Child Health 2001;37:403–404.
- McGuffin M, Hobbs C, Upton R, Goldberg A. American Herbal Products Association's Botanical Safety Handbook. Boca Raton, FL: CRC Press, 1997.
- Blumenthal M, Busse WR, Goldberg A, et al. The Complete German Commission E Monographs. Austin: American Botanical Council, 1998.
- Wynn SG, Fouger BJ. Veterinary Herbal Medicine. St. Louis: Mosby Elsevier, 2007.
- Bailey CJ, Day C. Metformin: Its botanical background. Practical Diabetes Inter 2004;21:115–117.
- Rasekh HR, Nazari P, Kamli-Nejad M, Hosseinzadeh L. Acute and subchronic oral toxicity of *Galega officinalis* in rats. J Ethnopharmacol 2008;116:21–26.
- Goetz P, Le Jeune R. Goat's rue (*Galega officinalis*) [in French]. Phytotherapie 2008;6:39–41.
- Atanasov AT, Tchorbanov B. Anti-platelet fraction from *Galega officinalis* L. inhibits platelet aggregation. J Med Food 2002;5:229–234.
- Pundarikakshudu K, Patel JK, Bodar MS, Deans SG. Anti-bacterial activity of *Galega officinalis* L. (Goat's Rue). J Ethnopharmacol 2001;77:111–112.
- Palit P, Furman BL, Gray AI. Novel weight-reducing activity of *Galega officinalis* in mice. J Pharmacy Pharmacol 1999; 51:1313–1319.
- Weiss RF. Weiss's Herbal Medicine, classic ed. New York: Thieme, 2001.
- Savino F, Capasso R, Palumeri E, et al. Advances on the effects of the compounds of a phytotherapy agent (COLIMIL) on upper gastrointestinal transit in mice [in Italian]. Minerva Pediatrica 2008;60:285–290.
- Savino F, Cresi F, Castagno E, et al. A randomized double-blind placebo-controlled trial of a standardized extract of *Matricariae recutita*, *Foeniculum*

- vulgare* and *Melissa officinalis* (ColiMil) in the treatment of breastfed colicky infants. *Phytother Res* 2005;19:335–340.
- 30.** Agarwal R, Gupta SK, Agrawal SS, et al. Oculohypotensive effects of *Foeniculum vulgare* in experimental models of glaucoma. *Ind J Physiol Pharmacol* 2008;52:77–83.
- 31.** Arora DS, Kaur GJ. Antibacterial activity of some Indian medicinal plants. *J Nat Med* 2007;61:313–317.
- 32.** Musa Ozcan M, Unver A, Ucar T, Arslan D. Mineral content of some herbs and herbal teas by infusion and decoction. *Food Chem* 2008;106:1120–1127.
- 33.** Joshi H, Parle M. Cholinergic basis of memory-strengthening effect of *Foeniculum vulgare* Linn. *J Med Food* 2006;9:413–417.
- 34.** Alexandrovich I, Rakovitskaya O, Kolmo E, et al. The effect of fennel (*Foeniculum vulgare*) seed oil emulsion in infantile colic: A randomized, placebo-controlled study. *Altern Ther Health Med* 2003;9:58–61.
- 35.** Jahromi BN, Tartifzadeh A, Khabnadideh S. Comparison of fennel and mefenamic acid for the treatment of primary dysmenorrhea. *Inter J Gynecol Obst* 2003;80:153–157.
- 36.** Alkofahi A, Al-Hamood MH, Elbetieha AM. Antifertility evaluation of some medicinal plants in male and female mice. *Arch STD/HIV Res* 1996;10:189–196.
- 37.** Shah AH, Qureshi S, Ageel AM. Toxicity studies in mice of ethanol extracts of *Foeniculum vulgare* fruit and *Ruta chalepensis* aerial parts. *J Ethnopharmacol* 1991;34:167–172.
- 38.** Azadkabt M, Baheddini A, Shorideh SM, Naserzadeh A. Effect of *Vitex agnus-castus* L. leaf and fruit flavonoidal extracts on serum prolactin levels. *J Med Plants* 2005;4:56–61.
- 39.** Wuttke W, Jarry H, Seidlova-Wuttke D, et al. The use of chasteberry extract (*Vitex agnus castus*) in gynecology [in German]. *Gunakologische Endokrinologie* 2008;6:82–86.
- 40.** Scaldarella LO, E'Ettore A, Ciotola A, et al. Use of *Vitex agnus castus* in patients with premenstrual syndrome, mastodynia and hyperprolactinaemia [in Italian]. *Giornale Italiano di Ostetricia e Ginecologia* 2008;30:79–94.
- 41.** Daniele C, Coon JT, Pittler MH, Ernst E. *Vitex agnus castus*: A systematic review of adverse events. *Drug Safety* 2005;28:319–332.
- 42.** Wuttke W, Jarry H, Christoffel V, et al. Chaste tree (*Vitex agnus-castus*)—pharmacology and clinical indications. *Phytomedicine* 2003;10:348–357.
- 43.** Atmaca M, Kumru S, Tezcan E. Fluoxetine versus *Vitex agnus castus* extract in the treatment of premenstrual dysphoric disorder. *Hum Psychopharmacol* 2003;18:191–195.
- 44.** Saberi M, Rezvanizadeh A, Bakhtiaran A. The antiepileptic activity of *Vitex agnus castus* on amygdala kindled seizures in male rats. *Neurosci Lett* 2008; 441:193–196.
- 45.** Bingel AS, Farnsworth NR. Higher plants as potential sources of galactagogues. *Econ Med Plant Res* 1994;6:1–54.
- 46.** Mills S, Bone K. *Principles and Practice of Phytotherapy*. New York: Churchill Livingstone, 2000.

Kathy Abascal, B.S.,J.D., R.H. (AHG), is executive director of the Botanical Medicine Academy in Vashon, Washington. **Eric Yarnell, N.D.**, is president of the Botanical Medicine Academy, a specialty board for using medicinal herbs, and is a faculty member at Bastyr University in Kenmore, Washington.

To order reprints of this article, e-mail Karen Ballen at: Kballen@liebertpub.com or call (914) 740-2100.

Copyright of Alternative & Complementary Therapies is the property of Mary Ann Liebert, Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.