Peonies In The Prairies

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"Hast thou ought in thy purse? … I have peper and piones (peonies) quod she."
Langland, '*Vision of Piers Plowman*,' 1375.
"Yes, it is good to have a garden and it is better still to work in it."
"The sight of a blooming peony has an inescapable lure for me."
Alice Harding, 1917.

I. INTRODUCTION

Peonies are grown in all settled parts of the Canadian prairies, hardiness zones 2, 3 and 4. Indeed, they were one of the small groups of the first non-utilitarian or decorative species planted by homesteaders as word got out early that they could withstand our harsh winters. Since they are also long-lived, they were often handed down in the family, lifted and divided amongst the descendants. There are many families in the prairies that still cherish these 'heritage' peonies in their gardens, although few have any idea what the varieties, or cultivars, are.

The farthest north I have seen peonies flourishing is Manning, AB, that, according to the Canada Plant Hardiness Zone Map, is in zone 1, which is in error. On the other hand, there are reports from parts of the prairies from Manitoba to Alberta of unnamed peonies flourishing in locations that often had minimum temperatures around -50^{o}C., including along the Beaverlodge River, 1-2 kms west of town. So it appears that at least some cultivars are zone 1b plants, but we do not know which.

The northernmost public collection of peonies is at the Beaverlodge Research Farm (BRF), zone 2a (or, USDA 2b), not counting coastal Alaska where there is a newly developed cut-flower industry since their peonies bloom in July and September when they bloom in no other region. At Beaverlodge, a single bed of 44 cultivars of herbaceous peonies was planted in 1947, and 42 continue to flourish with minimal care. Peonies were tested from 1920 on at BRF, but all test plots were discontinued to make way for new facilities. This collection was donated by long-time horticultural collaborator Cyril M. Clarke, a Jamaican black and Oxford graduate, of Teepee Creek, which is in the same county. He farmed open, flat land with little or no protection from windbreaks. He grew and evaluated many types of decorative plants, corresponded all over North America, specialized in peonies, and contributed to bulletins of the American Peony Society. He built up a collection that contained some 400 bushes of about 200 cultivars at any one time. The donation was of what he considered to be the finest cultivars that he had. A couple of years later he donated peonies to the City of Grande Prairie, which have all been lost, and at least 75 peonies to the University of Alberta, Edmonton, zone 3. These were subsequently moved to the University's Devonian Botanic Gardens, zone 2b, being established a few kilometers west of the city. Clarke's donation started the Devonian's collection which has since been substantially added to. It is the largest public collection in the prairies. The Devonian also has a small collection of species peonies.

Two other prairie collections deserve mention: those of William Foore near Sexsmith, also in Grande Prairie County, and the late Roy Campbell of Sherwood Park, near Edmonton. Foore was a contemporary of Clarke's: he got his start with Clarke's help and built up a collection of similar size. He was competitive and had a friendly rivalry with Clarke, but sometimes got carried away with odd theories, such as that the Aurora Borealis was responsible for the success of their peonies. This earned him a gentlemanly but thorough put-down from Clarke in the pages of the APS. Nothing remains of his collection except some seedling selections of unknown parentage raised by his daughter-in-law, Lottie Foore, against his advice. I have 11 of these in my garden. Campbell made his collection in the 1980's and 1990's, growing about 160 cultivars mostly more modern ones, including a couple of tree peonies against the house. He also tested many lilies, donating cut flowers to hospitals, etc. His collection was also dispersed when he got too old. Some went to the Devonian Gardens as did important records left by Clarke that he had acquired from a mutual friend. There are 50 different peonies in my garden, including two species types that flourish and two tree peonies that survive but without blooming.

Other collections in the prairies, mostly with 20-60 cultivars occur at a variety of public institutions, including the Universities of Manitoba and Saskatchewan; the Federal Research Stations at Indian Head, SK, and Morden, MB, and PFRA Indian Head, SK; Assiniboine Park, Winnipeg, MB, and the grounds of the legislature in Regina, SK. The Regina area seems to be the one with the most peony fanciers in the prairies.

Most prairie nurseries carry a few peonies, but none seem to specialize in them anymore since the retirements of F.P. Healey (Oakhill Farm) and Harrison's, although they only marketed about 25 cultivars each in any given year.

The major source of peony cultivars in Western Canada is Ferncliff Gardens, Mission, BC. The principal nurseries selling peonies in Canada and the USA are readily found on the internet.

The peony fancier, eager to build up a substantial collection of cultivars, must be prepared to put in a considerable effort to obtain the cultivars he or she may want. My own collection comes from eleven different sources in two countries.

"We see a flower not only in its form and color. Our imagination, too, brings a world of associations, adding beauty and interest to the object actually before our eyes."

John Clare, ca. 1842.

II. THE GENUS PAEONIA

There are about 30 species of peonies worldwide. The number changes with each new attempt to classify them. Modern methods of phylogenic analysis, including DNA and cluster analyses, have been applied. Some relationships between species have been clarified but others are found to be more complicated than previously thought. It is likely to take some years before an agreed-upon revision of the genus can be achieved. See Page (2005) for a review.

The genus is divided into three sections, or sub-genera. There are subsections in two of them, but these groupings, as well as most of the species, are mainly of concern to breeders and major collectors. In what follows, the sections are those established by Stern (1946), and the species in them as set out by Page (2005).

1. Section Moutan, the Tree Peonies. Although 'tree' is a misnomer, all peonies in this section have woody stems in shrub forms. Most species grow to 0.75 – 1.75 m tall, but a few reach 3 m. Page lists 12 species, 3 of which are hybrid species. In most books and articles, in this section the principal species is P.suffruticosa the Imperial peony, but this is now classed as a hybrid. It is clear that cultivated tree peonies are hybrids developed over the centuries by the Chinese. All species in this section are native to China. They did not reach Western Europe until the end of the 18th century. The cultivated forms are not as hardy as cultivated herbaceous types. The hardiest are only considered hardy to Zone 4.

2. Section Onaepia contains two species, both from Western North America. They are so different from all other peonies that they have never been hybridized with species from other sections. They have never entered the horticultural trade, and will not be considered further in this article.

3. Secton Paeon, the Herbaceous Peonies, contains the rest of the species. They originate from China and Japan through Asia to Western Europe, and from the Mediterranean to subalpine places. The most important species in Europe were P.officinalis, and P.mascula. In medieval times they were known as the female and male peonies respectively, and were both collected in the wild and cultivated for medicinal purposes ['female' because it was propagated by seed and 'male' because it was propagated by root division]. P.officinalis, 'Rubra Plena' is now thought to be an ancient hybrid with the also red P.peregrina. It is more vigorous than the parents and is still widely grown in Europe and North America.

   The most important species in China was P.lactiflora (synonym P.albiflora), the Chinese peony. In the wild it occurs from Japan to Siberia. The Chinese have cultivated it for almost 2,000 years for both medicinal and decorative purposes. Thousands of cultivars have been produced and lost. It has proved to be very malleable, having many desirable features, including ease of hybridizing with other

species in the section. Flower color ranges from white through magenta shades of pink and red, but no true red. That has come from crossing it with true red species, as have pale yellows and corals.

Hybrids: Crosses between two species are called Hybrids, and crosses between species in different sections are called Intersectional Hybrids. The former are relatively easy to make and the latter extremely difficult. Crosses between strains of the same species are simply called crosses. Selections are made from the progeny of a set of crosses and the rest discarded. Further selection may result in choice of a strain to be introduced as a new cultivar, or cultivated variety (to distinguish it from naturally occurring varieties, or botanical varieties, also occasionally termed 'botvars').

Species Peonies are generally inferior to the products of breeders, and are not grown in gardens with a few exceptions. Those that I am familiar with, because they flourish in my garden, are the double form of the Fernleaf peony. P. tenuifolia 'plena,' and P.anomala 'Ural' which is the magenta pink strain that is hardier than the red strain usually grown to the south.

'Plena' grows up to 75 cm plus flower. Flowers are early and fully double, and have good spicy fragrances, one per stem at the tip. The foliage is very finely divided. 'Ural' is the earliest of all, produces terminal single flowers on short peduncles all over the top of the bush. Bees prefer it to all others. The bush has the best shape of all my cultivars, forming a symmetrical mound that retains its shape for the whole season without support. The foliage is finely divided and attractive. In autumn the stems fall outward uniformly from the base. Every garden should have one, or perhaps a matching pair, but no more as the display only lasts 7-10 days.

III. HISTORY OF CULTIVATION

The history of peonies begins with Homer, 9th century B.C., with the myth of the physician Paeon. He was a pupil of Asclepius (in Latin, Aesculapius), the god of medicine and healing, and incurred his jealousy when he successfully treated the wounds of the gods Pluto and Mars during the Trojan War (circa 1250BC); so jealous that he plotted Paeon's death. Hearing of this, the grateful Pluto changed Paeon into the plant and named it after him. A rather muddled myth! There was also a people with their own language, Paeonian, who lived in the mountains north of Macedonia who were absorbed into Macedonia by Alexander the Great (circa 330BC). Aristotle's pupil, Theophrastus, only mentions it in passing for its medicinal uses.

Pliny seems to have been the first to give a detailed description of the plant and seeds of what appears to be P.officinalis about 77AD. Dioscorides, a slightly later contemporary, includes it in his treatise of about 500 medicinal plants; a treatise that was used right down to the era of modern science in herbal medicine. Cultivation is not explicitly mentioned before medieval times in Europe, or the 7th century AD in China, since gathering from the wild and cultivation usually existed side by side.

In China, also, medical uses of wild plants long preceded cultivation for that purpose, which in turn long preceded garden use. Herbaceous peonies were used in folk medicine since time immemorial, and have been in cultivation a long time. The Chinese domesticated tree peonies at least as early as Emperor Yang (605-616AD) when it was declared the Imperial Flower and many were planted on Imperial grounds. Flowering festivals have been held ever since. Herbaceous peonies were also extensively planted from the same period on. Tree peonies were called the King of Flowers, and herbaceous peonies the 'King's Ministers'.

The most famous peony fancier was the Tang Empress Wu Zetian (born 625, ruled 660-705AD). Beginning her career as one of the Emperor's concubines, she used her beauty, brains and ruthlessness to become Empress Regent and then Empress outright; murdering, amongst others, a baby of her own and pinning the blame on the then Empress to have her executed, after which she married the Emperor! When he had a stroke, she ruled for 20 years in his name. She then conspired against her more able son to get a softer one enthroned. He let her do the governing and finally abdicated so she could be crowned ruling Empress in her own right. On the other hand, she ruled well by lowering taxes, increasing productivity, diminishing bureaucratic corruption, reducing the size of the army while conducting successful wars to consolidate Chinese borders, improving the life of the lower classes, and promoting the arts, including gardening. One way or another she ruled from about 660AD till her death in 705. She loved tree peonies in particular. When she moved the capital from Chang-an to Luoyang, the peonies went with her, and she arranged for the planting of thousands of tree peonies. It became virtually compulsory to emulate her passion, so courtiers fell over themselves searching out and growing the rarest or most beautiful tree peonies. It was in the reign

of Empress Wu that serious breeding and selection of both tree and herbaceous peonies and how to grow them began. By the middle of the 8th century, cultivated peonies were grown everywhere, even by the lower classes. Emulating royalty continued on through the next dynasty which did not end until 1279AD. There was even a period of peony mania which arose around a rare green-flowered form that anticipated by hundreds of years the tulip mania of Holland in the 16th century. The Dutch went crazy for tulips with vivid streaks that we now know were caused by the tulip-break virus. Similarly, the green-flowered peonies were caused by a mycoplasma. In both cases the infected plants had declining vigor and eventually died which increased their rarity and drove up the price. See Boyd (1928) and Fearnly-Whittingstall (1999).

Roots, seeds and bark are used medicinally to this day in Chinese folk medicine; roots and seeds are also used as seasonings, and roots as vegetables. Modern science caused the gradual elimination of such uses in educated circles. Recently, however, Chinese scientists have discovered a number of medically active compounds in varying amounts in these parts of peonies. So the story is not over yet. As to taste, the modern palate finds them rather bitter to highly unpalatable. Jane Fearnly-Whittingstall (1999) followed one old recipe and wrote, "It was fibrous and starchy and had a smell and flavor reminiscent of turnips soaked in wallpaper paste mixed with turpentine!" See her also for the best recent account of growing peonies in China from past to present; but for recent advances in peony taxonomy see Page (2005). Note also that there are many Chinese poems referring to peonies, but few have been translated into English.

Both Chinese and tree peonies were rare in Europe until after the Napoleonic wars. Then tree peonies began to arrive by sea. Initially, herbaceous peonies arrived by land via Turkey and Russia to France where Western breeders first explored these new arrivals. Good results were soon obtained, some of which are still in trade, e.g. 'Edulis Superba' (1827), and 'Festiva Maxima' (1851). By the latter half of the century there were breeding programs in France, Britain, Germany and the USA, increasing continually until the First World War. Some of our finest cultivars today were introduced in this period. It seems that virtually none of the herbaceous cultivars in trade in the West originated in China. The Japanese, however, had different aims in breeding both tree peonies and in developing the Japanese form of herbaceous peony. The best of their cultivars were imported directly, some of which are still in trade. Ultimately the tree and Chinese peonies derive from trade sources in Luoyang in Gansu Province and Heze in Shandong. More than 500 tree cultivars are kept on sale in these centers, but only a small number have yet to be imported to the West (Fox, 2010).

The American Peony Society

The most important peony society in the world today is the American Peony Society, founded in 1902. The primary impetus for its formation was the great need of sorting out the nomenclature of all the peonies in trade, both at home and abroad. The Dutch growers were trying to do the same at that time. There was too much duplication, too many varieties being sold under different names by different nurseries, no standards,

etc. The first fruit of the Society's endeavors was "Peonies: The Manual of the American Peony Society" James Boyd, editor (1928). The APS publishes a quarterly bulletin dealing with all topics its contributors are interested in, and periodically publishes books, booklets or pamphlets dealing with particular topics. The APS is the international registrar of new varieties and also accredits old cultivars introduced before APS' founding. Certain standards have to be met for registration.

The Canadian Peony Society was founded in 1998 to coordinate peony-growing activities and foster the accumulation and dissemination of information about them. It holds an annual exhibition and publishes a newsletter and a website. It recognizes 5 regions in Canada: Maritimes, Quebec, Ontario, Prairies, and BC, and coordinates activities of regional groups.

The Prairie Peony Society, formerly the Regina Peony Society, was founded in 2001. It holds an annual exhibition and publishes a newsletter and website. Its activities are in the Regina area, but anyone can join and participate via the newsletter and social media.

IV. HERBACEOUS PEONIES

a) THE BUSH

A peony grows into a bush consisting of roots, root crown and stems. The roots may be fibrous feeding roots that extend out into the soil or perennial thickened fleshy, tuber-like storage roots developing under the perennial root crown. Stems are annual and arise from the top of the root crown and are typically un-branched. As the plant ages the root crown expands and more and more root tubers and stems are formed. The sturdiest stems develop a terminal flower bud. Additional flower buds may form in the axils of upper leaves, up to 5 per stem. A short stem or peduncle grows and a flower is formed at the end. All flowers are up-facing. The topmost flower opens first and is always the largest. The topmost auxiliary or side flower may grow taller than the terminal flower in some cultivars.

Leaves form all up the stem and are much divided and attractive. They come in shades of red or pink when they first unfurl, and turn green as the chlorophyll forms. There is a range of greens amongst the cultivars. In the fall the process is reversed but much more variable, the leaves turning red, purple, yellow, dull green, etc., depending on the cultivar. The foliage of each cultivar appears different, but the differences are hard to describe or characterize. The foliage remains attractive the whole season, long after the flowering period is over, so the bush is always attractive in the garden-scape.

Size and floriferousness of bushes and their components are limited by their genetics. But that only determines the limits. Within them the gardener can do a great deal to improve size and productivity through soil and fertilizer management, spacing, and site location (see below under Growing Peonies).

If growth is good, bushes may be lifted and divided after as little as three seasons, although five would be more common in the prairies. This is usually done in the fall, soon after the first frost. On the other hand, bushes may be left in place indefinitely, 100 years or more.

Pot-grown peonies were widely used in China and Japan as ornaments in the house. They were easily moved, donated or passed down. They can be placed under conditions that force them into flower out-of-season. Both herbaceous and tree peonies can be grown this way.

b) FLOWER STRUCTURE, DOUBLING AND TYPES

The several types of herbaceous peony flowers all depend on the degree to which floral parts are transformed into petal-like structures, the multiplicity of transformations, and the nature of the transformations, whether petal-like or lath-like: the former are called ‘petaloids’ or ‘petalodes’, and the latter ‘staminodes’ if the tips or edges contain yellow enclosed pollen whether viable or not.

The flowers of wild or species types consist of a 'peduncle' or stem terminating in a disc-shaped structure at right angles known as the receptacle. The receptacle is subtended by 5 sepals that protect the bud and persist after opening; which may in turn be subtended by one or more short leafy bracts. On the outer edge of the receptacle are borne 5-10 petals, then several concentric rows of stamens; then the misleadingly-named disk, misleading because it is ring-like and arises out of the disc-shaped receptacle, surrounding the base of the 3-5 carpels; it may be smooth, bumpy, dentate or sheath-like. The carpels are flask-shaped, smooth or hairy, narrowing to a neck above which is the more or less flattened sticky stigma where pollen is caught. All these parts start out green and may or may not become pink or red, except that stigmas tend to become white, and hairs may be silvery.

Transformation of some to all of these parts into petaloids is known as 'doubling.' There is a progression in degree of doubling from multiplication of the number of true petals, or multipetally, in the petal layer; to transformation of stamens into petaloids from the outside in; to alternating rows of stamens and petaloids, to random transformation of stamens with some remaining as normal stamens; to transformation of carpels, starting with stigmas, and then splitting and transformation of the carpels into petaloids; followed by elongation of the bumps or teeth of the disk into petaloids also. In peonies a further transformation can also occur, namely, the whole flower may double, forming a 'flower within the flower.' The inner flower can also show a progression from incomplete transformation of the stamens to full transformation of the inner disk.

A cultivar or horticultural variety is described according to its terminal flower. The root crown of a peony bush sends up a number of un-branched vertical stems with a terminal flower and 0-5 side flowers on short peduncles growing out of axils of upper leaves. The side flowers tend to be a bit smaller and less double. Stems with a double terminal flower but semi-double side flowers may occur. Some cultivars may not attain their characteristic degree of doubling until a few years after planting, or may require soil improvement, or may require transplanting to a more favorable location. Breeders aim to stabilize a new cultivar to a specific degree of doubling before introducing it.

Comparing cultivars, there is a continuous range in the amount of doubling from single to the twice-fully double flower-in-flower types. In the latter the receptacles become more dome-like than disc-like. After petals and petaloids fall off, the receptacle bears scars where they were attached. The true petals form a continuous ring distinct from the individual scars of the petaloids. Receptacles of flower-in-flower cultivars have two such rings. True petals are also termed 'guard' petals.

Flower-in-a-flower-in-a-flower is also possible but rare: I have only seen it twice for sure.

Flower Types or Classes

Given the above variations in structure, placing cultivars into types or classes may occasionally be somewhat arbitrary. But there is general agreement that the following classes are useful and practical.

1. Single: the guard petals may show some multipetally, but the other flower parts should show no transformations or doubling. Examples: Krinkled White, America, Honor, Cheddar Charm, Clair de Lune, Scarlett O'Hara, and wild species.

2. Semi-double: some but not all of the stamens are transformed into petaloids. Partial transformation of stigmas and carpels may also occur, resulting in a central petaloid tuft, but is not required for this class. Examples: Paula Fay, Auguste Dessert, Cherry Hill, Coral Charm.

3. Double: essentially all the stamens are transformed into petaloids. A few small stamens may remain, hidden at the prime degree of flower opening, but revealed when the flower begins to fall apart, e.g. Sarah Bernhardt. Transformation of the carpels may or may not occur. This class contains all further degrees of doubling: see below under 'Forms,' with just two exceptions: the 'Japanese' and 'Anemone' classes.

4. Japanese: in this class the stamens are transformed into narrow, strap-like forms called 'staminodes' with thickened yellow tips or sides, or the whole staminode may be irregularly thickened. These thickened yellow areas contain pollen that cannot be released naturally. Breeders, however, are sometimes able to cut it out and use if for pollination. Petals and carpels are normal. Examples: Mikado, Ama-No-Sode, Cora Stubbs.

5. Anemone: in this class all the stamens are transformed into narrow, strap-like, thin petaloids devoid of pollen or yellow thickenings. Partial transformation of carpels can occur. Examples: Red Bird, Gay Paree, Bowl of Beauty, White Cap, Hot Chocolate.

Forms of Double Flowers

The above classes suffice for most purposes, especially commercial ones. The 'Double' category, however, is huge in the number of cultivars and is no less huge in degrees of doubling and other types of variability. A number of descriptive terms are often used, but are not accorded class or even sub-class status because some of the flowers may develop from one type to another, or because intermediate forms exist. The most common descriptive terms are:

‘Double’ is the inclusive terms that covers all the variations in doubling. ‘Fully Double’ means that all floral parts are transformed into petaloids, although sometimes vestigial carpels may remain. Lighter colored cultivars may exhibit red flecks on some of the petaloids deriving from carpels, e.g. ‘Festiva Maxima.’
In most peony flowers the guard petals are longer than the petaloids, created a cup-and-saucer effect. If they are distinctly longer and the petaloids form a dense, central cluster, the result is termed ‘Bomb’-shaped. When the guard petals are the same length or shorter and the central cluster is globe-shaped, it is ‘Globular.’ These forms may stay constant until the flower becomes over-mature and falls apart, or they may be developmental phases transitioning to a more open spread of the petaloids as the flower matures into the form characteristic for the cultivar.

‘Flower-in-flower’ cultivars may have two bands of the longer guard petals separated by a band of shorter petaloids, in which case the petaloid band is referred to as the ‘collar,’ and the inner flower as the ‘crown.’ Where the crown is only partially transformed, it may be more like a tuft, mostly made up of the inner band of guard petals, than a crown, i.e. flower-in-flower cultivars may have a fully double outer flower with a semi-double inner one. Tufts may also form in semi-double cultivars. In many cultivars the petaloids grade evenly in length from bottom to top, resulting in large globular or conical flowers without distinct collar or crown unless of different colors. In still others, the crown may remain somewhat undeveloped resulting in a saucer-topped or rather flat-topped flower that resembles a truncated cone.

The number of petals and petaloids in some of the larger, dense flower-in-flower cultivars blooms can be huge, well over 500. their shapes are tremendously variable, from large and simple petals, through partially split, fully split, strap-like, down to filament-like, with simple or frilled outer edges, straight or longitudinally folded. The champion ? : primary flowers of ‘Cornelia Shaylor’ frequently exceed 500 petals and petaloids. One such flower contained over 1000, so it is literally the ‘1000-petal’ peony!

One of the many pleasures provided by peonies lies in observing the gradual unfolding of complex flower-in-flower buds and the stages they go through until the prime masterpiece is reached. Development of the flower does not stop there, of course, but continues on through maturity and over-maturity to petal fall, as the carpels ‘take over’ and go on growing till the seeds are fully formed. Recommended practice, however, except for breeders, is to deadhead, i.e. to cut off the dead flower residue (receptacle, carpels, peduncle) so that energy produced by the leaves goes to the big storage roots attached to the root crown. The buds of next year’s stems are formed before the leaves die each fall.

A problem with some large, dense, complex buds is that full opening of the inner flower can take so long that the guard petals of the outer flower have already begun to droop. This is a handicap for exhibition purposes, but is not a problem in the garden or for cutting for the house.

Note that this account is based on my own experiences and notes over the last 25 or so years, and may differ in some respects from other authors. In fact, I can find no two authors whose interpretations are exactly the same, except where they simply copy one from someone else without reconsideration. For a more detailed discussion, see Hollingsworth (2009).

c) FRAGRANCE

Many peonies are fragrant, many are not, and some smell unpleasant. In other words, there is a large range in scent in peonies across the cultivars. There is also a range of qualities of fragrance from sweet to spicy-peppery and of odors from mildly unpleasant to something reminiscent of rotting meat, although not nearly as strong, and a range from strong to weak to none.

Cut peonies can smell fairly strong in a small room, a bit stronger than hybrid tea roses, but none approach the strength of hyacinths or lilacs. In the garden, however, you usually have to get close to a bush to smell it. On a still evening, on the other hand, if there are several bushes close together, their scents may combine into a pool that drifts and is found in unexpected places in the garden, sometimes well away from the actual bushes.

Fragrance comes from glands at the bases of petals and larger petaloids. As a result, the Singles, Japanese, Anemone, and more staminiferous semi-Doubles tend to have little or no scent: whereas the Doubles are often well-scented.

Since smelling the different flavors of fragrant peonies is one of the great pleasures in growing them, fragrant cultivars should be placed near the front of the border so that you do not have to wade through a sea of mixed border plants to smell them. There are other considerations, however, such as height, as to where a bush is placed.

People vary a great deal in both their sensitivity to fragrances and their personal tastes. One person's favorite cultivar may be another's indifferent choice; still another may be unable to smell weaker fragrances. What follows, therefore, is strongly influenced by my personal sensitivity and taste. Nevertheless, there is wide agreement as to the most desirable fragrant cultivars.

There is a basic peony fragrance that underlies most fragrances, and even cultivars considered to be non-fragrant or odoriferous have a touch of it. In the best cultivars, their characteristic scents tend, however, to mask this underlying one. Peony fragrances can be relatively simple or quite complex with overtones, layers, undertones, even a lingering after-smell, just like perfumes or wines.

Most of us have some but limited experiences of perfumes and of the bouquets of different wines. In those fields it is possible to get training in distinguishing and

describing fragrances, and each has developed a vocabulary to enhance communication and consistency between evaluators, even if it is not always very intelligible to the rest of us. In other words, there are people with trained noses and vocabularies based on reference standards that enable conveyance of fairly precise knowledge of the scents involved.

In gardening, we appear to lack such expertise both in general and for particular genera such as peonies or roses. If anyone with a trained nose has attempted to develop a system for evaluating the fragrances of peonies, I would like to see it. Any system that is to be useful to gardeners, however, needs to use standard cultivars that are widely available as reference points.

Floral scents are extremely difficult to describe. The only practical way is to compare the scent at hand with one that most people know. For example, the great peony cultivar 'Philippe Rivoire' has scent that is nearly unique in peonies, but reminds most people of Hybrid Tea roses: a comment frequently made that makes little sense because of the wide range of scents in roses. The type of rose needs to be specified: in this case, the rose cultivars Mr. Lincoln and Chrysler Imperial. However, if you cut blooms of Philippe Rivoire and Mr. Lincoln and place them side-by-side, you will find them to be quite distinct. So the appropriate qualifier required is 'reminiscent of Mr. Lincoln.' Because of such difficulties, peonies are usually simply described as fragrant, or not, without worrying about characterizing the various fragrances. This is a pity, since much useful information is lost as a result.

Fortunately, most people like their peonies to be fragrant. The big three cultivars of commerce, Festiva Maxima, Sarah Bernhardt and Karl Rosenfield, frequently sold as white, pink, and red peonies respectively, are all desirably fragrant. So even beginners in growing peonies, with no knowledge of the cultivars, are likely to start with some of the most fragrant and best overall.

In making my own notes on different cultivars, I use a basic seven-point good-to-poor quality rating which indicates how much I like them, and which anyone can follow (or devise), but which does not actually describe any fragrances, or its strength. Furthermore, fragrance may vary with time of day, weather, humidity, wind, and flower maturity outdoors. Final evaluation is best done on flowers cut at bud stage that open indoors. Strength of fragrance is best evaluated separately from quality, and only combined with quality when conclusions are being drawn.

Terms I use when appropriate are categorized as follows: 1. Basic peony type; 2. Sweet, with or without honey or nectary tones; 3. Flowery, with or without Hybrid Tea red rose, daffodil or orchid tones; 4. Fruity, with or without orange or peach tones; 5. Perfumy, with or without soft or warm, spicy, peppery, or pungent tones; 6. No fragrance, None; 7. Unpleasant: only with flower age (usually meaty), meaty all the time, or foul (rotting meat, cat pee, toilet).

Bearing in mind that while there is general agreement as to which are the most fragrant cultivars, and these are the only ones that catalogues may list as fragrant, opinions have varied from the first American Peony Society Manual (1928) to the present. Opinions may vary between locations, individual sensitivity and taste. Here are a few examples based solely on my experience that for me serve as reference cultivars for fragrance qualities:

1.	Basic Peony Type		Karl Rosenfield, Luetta Pfeiffer, Auguste Dessert, Mikado
2.	Sweet	a)	La Perle, Marietta Sisson, Elise Renault
		b) honey	Baroness Schroeder
		c) nectary	Ural (P.anomala)
3.	Flowery	a)	Cornelia Shaylor, Sarah Bernhardt, Mdme Claude Tain
		b) Hybrid Tea red	Philippe Rivoire (strong); (mild)-LaPerle, Mdme de Verneville
		c) daffodil	Rose Shaylor
		d) orchid	Rose Shaylor
4.	Fruity	a) orangey	LaPerle
		b) peachy	Elise Renault
5.	Perfumy	a) soft or warm	Rev. H.N. Traggitt, Rose Shaylor, Mdme Claude Tain, Red Bird, Mdme de Verneville, Fernleaf
		b) and spicy	Rose Shaylor, Chestine Gowdy, Sarah Bernhardt, Laura Dessert, Marietta Susson
		c) and peppery	Rose Shaylor, Fernleaf Rubra Plena (P.tenuifolia)
		d) and pungent	Karl Rosenfield, Luetta Pfeiffer
6.	No Fragrance, None		Ama-No-Sode, Hot Chocolate
7.	Unpleasant	a) only as flower ages, usually meaty	Victoire de la Marne, Clemenceau, Mons. Martin Cahuzac, Hiawatha, Karen Gray, La Lorraine
		b) from flower opening, meaty	Clair de Lune
		c) foul (rotting meat, cat pee, stale toilet)	Lady Alexandra Duff, Thomas C. Thurlow, William F. Turner

Cultivars are listed in order of decreasing strength. Note that a cultivar may be listed under more than one fragrance quality. Rose Shaylor is listed under more categories than any other cultivar. In fact, Rose Shaylor has the most complex fragrance of any peony that I have yet encountered.

My favorite peonies for fragrance are:
Strong – Philippe Rivoire, Rose Shaylor, Karl Rosenfield, Rev. H.N. Traggitt, Top Brass
Medium – Cornelia Shaylor, Laura Dessert, Sarah Bernhardt, Chestine Gowdy

Note that some of these ratings were based on only a small number of samples. Those in the 'foul' category have been rated fragrant by others at different locations. Although it is well known that some peonies smell unpleasantly, only a very few authors even mention it (Harding, 1917).

d) CUTTING, STORING, DRYING FLOWERS

The peony is one of the best flowers for cutting and display in house, exhibition or competition. For long life, flowers should be cut as the bud begins to open; for singles,

Japanese and Anemone types, cut soon after the bud begins to open, whereas for doubles and especially the flower-in-flower types, shortly before the petals unfurl. Experience may be needed to determine the optimum degree of opening for any given cultivar. This will vary depending on number of petals and whether it is to be put on display immediately or held for shipping.

The cut stem is usually 15-30 cm long. On bringing it inside, cut about 2-3 cm off under warm water and place quickly into water containing a little sugar, or a package of florist's salts, to prevent air blockage of the vascular system and provide some energy for the unfurling.

Cut peonies may be stored in a refrigerator, or a cool, dark place for up to two weeks before being brought out into the warmth and light, and will still open. Exhibitors and florists make much use of this.

Peonies can be dried for dried-flower arrangements. Some cultivars are better than others, e.g. Ann Cousins, Auguste Dessert, Felix Crousse, Karl Rosenfield, Richard Carvel, etc. Reds and darker pinks retain their color exceptionally well. The flowers are cut fully open, hung upside down in a warm, dark dry place for two weeks. An airing cupboard is ideal. Alternatively, they can be cooked in a microwave oven at a medium setting on absorbent paper, changing it as often as needed. The leaves are then cut off, and the flower is ready for use. Flowers can also be cut off and speared on wire before drying. Silica gel may also be used for small batches, and is particularly good for preserving the brightness and clarity of petal color. How long dried flowers retain good color and form depends on the conditions in which they are used. This account is largely taken from Fearnley-Whittingstall (1999).

V. TREE PEONIES

Tree, or shrub, peonies were prized by the Chinese over herbaceous ones from the beginnings of peony cultivation (see above under History). The shrubs are quite easy to grow if hardy enough, have larger flowers in a wider range of colors, and are just as fragrant. Since they are shrubs, the plants continue to grow and expand from year to year, often in aesthetically pleasing irregularity. Shrubs of most types are 0.7-1.5 m tall but may continue to grow slowly in diameter to two or three times that in warmer climates, where as many as 400 flowers have been produced by a single shrub (Page, 2005). Depending on species or cultivar, shrubs may be few-stemmed but much branched and irregular, or upright clumps of straight stems, or anything in between. A few types can grow to 3m or more in European and Chinese climates.

Flowers are mostly single or semi-double on rather short peduncles, and are sometimes beautifully ruffled. Color ranges from white through pinks, golden yellow, reds, lavender and purples (but no blue), with or without dark blotches, flares or gradations of various colors. Some are much larger than flowers of herbaceous peonies, with diameters up to 20 cm.

Tree peonies are rated as hardy to Zone 4, although that does not apply to all species or cultivars. There are, therefore, only a few areas of the southern prairies where they can be grown. They are often grafted onto roots of herbaceous peonies in order to increase the rate of growth. But this introduces an area of weakness both physically and greater susceptibility to winter coldness. Grafts are weaker in all species until years have passed and the graft union has grown over. Grafted plants should be planted deeper to protect the union.

Tree peonies also produce flowers terminally, or largely on top of the shrub. Whereas herbaceous peony buds receive winter protection by being below the soil surface, tree peony buds are exposed to the winds and fluctuating conditions of winter on the top of the shrub. So even if the shrub survives, the buds and shoot tips are liable to die back; the shrub survives but there is no bloom. I have two such plants that have survived 6 or 7 years but always die back partially. So far, all attempts to protect them by different methods of mulching have failed to prevent dieback. However, the fact that these shrubs have survived for so long does offer some hope that hardy strains can eventually be found.

The next best thing to a hardy tree peony should be a hardy hybrid between a tree and an herbaceous peony. In this, there has been definite progress.

VI. INTERSECTIONAL OR ITOH HYBRID

Hybridizing tree peonies with herbaceous peonies turned out to be extremely difficult. Many tried and none succeeded until a Japanese breeder, Toichi Itoh, obtained in 1948 a number of seeds that grew into plants (from pollinating 1200 plants). Some nine grew into shrubs and seem to have been ignored. The rest were herbaceous. Unfortunately, Mr. Itoh died before any actually flowered, but his son-in-law, Shiagao-Oshida, looked after them and in 1963 they began to flower. Four of these were selected for introduction: 'Yellow Crown,' 'Yellow Emperor,' 'Yellow Dream,' and 'Yellow Heaven.' All produced rounded bushes up to 90x90cm in size. A decade passed and nothing much happened, however, until an American, Louis Smirnov, discovered them and got permission from Itoh's widow to import and register them with the APS, which happened in 1974. Since then, several breeders have succeeded in breeding Itoh-type or Intersectional hybrids between the sections Moutan and Paeon. There are now over 50 registered cultivars, although much fewer are yet in trade (Page, 2005).

The range of colors in intersectional hybrids already includes white, pink, assorted reds, golden yellow, copper red, and orange, often with striking flares of contrasting colors. In other words, almost the whole range of colors obtainable from tree peonies. In the next few years when these reach the market, we will be able to grow a whole new set of peonies in suitable climates.

The intersectional hybrids so far produced are all herbaceous. As a group they are hardier than tree peonies but less hardy than herbaceous ones. As they become more widely grown and tested, differences are being found, and some show promise for the prairies. In particular, 'Bartzella' readily flourishes in the Edmonton area, and Brian Porter of the Prairie Peony Society says that 'Garden Treasure' is hardy to zone 2a. This means that we shall soon be able to grow intersectional hybrids all over the prairies.

These hybrids take 4 or 5 years to develop into a mature bush, like all other herbaceous peonies, and have attractive foliage, so they are good in the landscape, and are fragrant.

VII. GROWING PEONIES

a) PLANTING

Care taken in establishing peonies will be rewarded by many years of floriferous growth.

Propagation of peonies is from seed or by division of the root crown. Seeds, however, never breed true, and are therefore only used for breeding, where searching for new strains is the objective.

Plants are usually lifted in September or early October. Since the roots are brittle, care is needed not to damage the tuber-like storage roots. They are not tubers, however, and will not grow into new plants if broken off from the crown. After shaking or washing off the dirt, allow them to dry for a couple of hours when they will be easier to handle and less brittle. With a sharp knife, because clean cuts heal faster, cut the root crown into pieces that include a storage root, a portion of the crown and 3-5 stem buds or 'eyes' and store in a dry place so that the cuts can heal. If re-planting immediately, dusting the cuts with a bulb dust is recommended. It is possible to dig around the roots on just one side, vertically cut off a suitable piece, bulb dust the cut and fill in the hole again, leaving most of the plant undisturbed. This is only done when the gardener wishes to keep the peony in that place without going to the trouble of replacing the soil. Peonies do not do well when planted into soil that has grown peonies in the last 3 or 4 years; so new plantings should be into soil new to peonies.

Site selection. Peonies will grow in a wide range of soil types and pH 5.6-7.0, but do best in a slightly acid clay loam that drains well. They rot if too wet, and die if too dry during establishment, about 3 years, the risk decreasing with time. They do not tolerate standing water. Choose a site with full sun for at least 8 hours a day with protection from prevailing winds during the bloom period. Since blooms last longer when it is relatively cool, a site that becomes shaded in the afternoon will give longer-lasting flowers and less drought damage.

Preparing the hole, trench or bed. Digging to 45 cm deep and 60 cm diameter per plant is recommended, including the sub-soil where the soil is shallow: discard the subsoil. Fill the hole with water and allow it to drain away; in the bottom layer mix raw bone meal, well-rotted manure or compost with topsoil. This layer should be below the roots of the new plant. Note that sterilized steer manure is excellent, but others such as poultry manure are too high in nitrogen. Then mix topsoil with a handful, not much is needed, of NPK fertilizer in the proportions of 1:2:2 or, if a soil test has been taken, according to its recommendations. Fill the holes, water heavily and allow to settle. If possible, allow beds to lay fallow for several months before planting in the fall. It is important that the soil not settle significantly after planting as that effectively changes the planting depth.

Planting Depth is critical. There should be 5 cm of tamped-down soil above the topmost stem buds or 'eyes.' Only unmanured soil of good tilth should ever be in contact with

the plant piece. This remains true throughout the life of the plant. Once planted, water heavily, and make sure the hole does not dry out before winter sets in. Best results happen when the thick storage roots generate some fibrous roots before winter. Mulching, after winter starts, should be done with care: only low-nutrient mulch should ever be used, should only be used the first winter; and should be removed at the onset of spring. Do not fertilize again before the fall of its second season.

Spacing. The farther apart, the greater the eventual size of the bushes, and the easier it is to cultivate around and between them. In a peony bed a distance of 1 m in all directions is the minimum. Single plantings into mixed borders require the same-sized hole and soil preparation as above. Here it is the distance from the other perennials that matters. Spacing should be about 1 m from other herbaceous perennials but at least 2 m from woody shrubs, and more from trees. Bushes expand their root crowns slowly but steadily in all directions that conditions permit. As the crown increases, so do the number of stems and flowers until a maximum that the spacing and growing conditions permit, most often at about 10 years. With suitable maintenance this level of productivity can be maintained for many years. Height of the stems and size of the primary or terminal flowers also tend to increase for the first few years until the maximum for the cultivar is reached.

Placing. Avoid planting near conifers and other evergreens. Sooner or later their roots will invade the peony's root space and gradually take over. Conifer roots may extend to a distance equal to their height from the trunk. Moreover, conifer and evergreen foliage, when it falls, acidifies the soil. Deciduous trees, on the other hand, are more compatible. Peonies may do quite well if planted under the outer half of the canopy, although never as well as in the open. Avoid growing ground-cover plants as they are too aggressive and may smother the root crowns.

The height of the peony bush must be allowed for. The better nurseries give mature cultivar plant heights for their growing conditions. Treat them as relative, not absolute: likewise for season of bloom, early, middle or late. Actual dates vary with latitude, altitude, climate and micro-climate. The tallest cultivars should be placed at the back of the border or in the middle if it is seen from both sides.

Filling in the spaces between perennials with annuals is the basic technique for creating a solid bed or border, until the perennials fill it on their own. For peony beds, it is preferable to keep annuals to the outside, at least until the peonies are well established. Grow flowers that bloom before or after peonies, so that they do not detract from the peonies, in front of or at the back of the bed. Annuals may be planted up to the edge of the canopy of established peonies without ill effects, especially the shorter ones.

b) CARE DURING THE SEASON

Fertilizer. Apply fertilizer around and between the plants in early spring. Never put fertilizer or manure on the crown of the plant at any time of the year. Use NPK in the proportions of 1:2:1. High phosphorus promotes flowering, whereas high nitrogen promotes vegetative growth only. Avoid lawn fertilizers. Manure that is not high in N may also be used.

Cultivate between plants to work in the fertilizer and aerate the soil to a depth of 5-10 cm. Cultivating deeper disturbs the root and soil structure. In mature beds, earthworms create a lattice of tunnels that both aerate the soil and allow more effective percolation of water.

Spraying v. Botrytis, or early blight (B.paeoniae) should be done as soon as the shoots emerge. Spray the whole crown. This should be done on all peonies every year as a preventative measure. If the disease is present, spray once or twice more, until shoots exceed 25 cm tall. Use copper or manganese-based fungicides, and follow label instructions.

In damper climates or wet weather, another spray may be applied to upper parts to prevent common grey mold (B.cinerea), or late blight, just before buds open: spray damages open flowers. Stems, buds, flowers or leaves infected by either of these diseases should be cut out whenever seen and disposed of, preferably by burning.

Staking. Peony plants tend to sprawl, and flowering stems tend to flop in windy and wet weather, and may break if the flowers are large, fully open and soaked. Most forms of staking are more or less unsightly, so each grower must decide between efficiency, labor required, cost, and amount of support.

I stake in two stages: the bush in spring and flower stems of some cultivars shortly before buds open. Commercially available peony rings tend to be too flimsy, have only one ring, or have a too-prominent stake. Twine stretches and requires continual re-adjustment. I prefer tomato rings, in three widths, usually with the bottom ring clipped off as it is too narrow. They are left in the ground year round to discourage deer from trampling the crowns. The top ring should be about mid-way up the foliage-bearing part of the stems. This allows most of the foliage to arch outwards above the ring, producing a gracefully shaped bush for the whole season; and permits easy, no-trampling passage around them.

This is all the less dense cultivars require. Singles, semi-double, Japanese and Anemone cultivars generally do not require staking of the flowers. Doubles, especially flower-in-flower cultivars, often do. Make flower stem support as inconspicuous as possible: green-painted bamboo stakes and green twine offer the best solution. The bamboo

stakes can be braced inside the tomato rings for additional support, and excess length of the stake may be trimmed off with secateurs. No system is weather-proof, however, and violent, gusty winds may still cause damage. Supporting individual flower stems, which can be done with bamboo stakes and twine, is much too laborious for ordinary purposes, and causes more damage to the root crown than just supporting the whole crop. After heavy rain, shake moisture out of open flowers to prevent rot and grey mould: tapping the peduncle may suffice for less dense flowers, whereas heavy flowers should be grasped just below the flower and shaken gently.

Disbudding. If the largest possible terminal flower is desired for exhibition or other reasons, pinch out the side buds as soon as they are clearly formed. The best, and longest, garden display, however, is obtained by leaving them to grow and flower. This can double the time the bush is in flower.

Watering. Although peonies are considered to be quite drought tolerant, that just means they survive. For best results, supply plenty of water as long as the soil drains. The amount required, of course, depends on weather and rain, soil and slope, and stage of growth. It is desirable to water heavily, ensuring deep penetration, and less often, usually not more than once a week, than frequently but lightly. Think in terms of 2-3 cm of water from all sources per week.

In the dry prairie climate, we can get away with overhead watering of the bushes before flowering because the foliage dries off quickly. Prolonged water standing on leaves promotes leaf spot fungi. Flowers should never be watered. Drip irrigation can be used with or without little sprinklers that spray horizontally just a few inches above the soil.

Falling petals often get caught on leaves. If these get rained on, the area of the leaf covered by rotting petals is smothered and dies, creating unsightly brown splotches that remain for the rest of the seasons. Therefore, shake fallen petals and petaloids off the foliage onto the ground. Water as needed, rather than a fixed amount or frequency, until the leaves start to turn.

Deadheading. Once flowering is finished, the peduncle with its carpels should be cut off and disposed of in order to conserve energy that would otherwise go to seeds, and to reduce risk of grey mould.

Fall Clean-up. Below-ground development continues until leaves start to turn. Fall colors vary from cultivar to cultivar. Foliage tends to shed rain to the outside, away from the crown. Dead stems also fall outwards so that if uncut the crown is not smothered by its own foliage. Stems should be cut off at ground level, removed and burned. This is the most important means of controlling or at least reducing early blight (B.paeoniae). Likewise, remove all peony debris.

Diseases. In the harsh northern climate of the prairies the two Botrytis diseases are the only serious ones. And of those, grey mold is strictly weather dependent. Early blight, however, is very serious. If not controlled it will gradually kill the plant and spread to others. First signs are when shoots emerge and then wilt, turning blackish: remove and burn immediately. Infection may show up on the more mature stems at the ground line as smooth and brown with growth lines. In both cases, as soon as seen, cut below the ground line, taking care not to damage other stems. This and spraying as indicated above are the only means of control. Another sign is small, dull brown buds that are dead. They were infected and killed as the shoot grew past infected material around the ground line. Pinch them out and dispose of them. Other diseases are dealt with thoroughly in the reference books.

Ants. There are no serious insect pests of peonies in the prairies. Likewise, see the references. However, ants are often seen. An anthill against the base of a plant will eventually kill it. Otherwise, ants on the bush or buds are either harmless or beneficial. Ants go to peonies to collect sap, which in vigorous bushes may seep from the flower buds. They may attack or discourage other small insects. Some peonies exude sap or nectar from glands in leaf axils so crawling insects may never reach the flower.

VIII. REFERENCES

1. Boyd, James. Ed. 1928. *Peonies: the Manual of the American Peony Society*. Amer. Peony Soc., 336 pp., plus 22 p. Supplement, 1933.

2. Davidson, John G.N. 1991. *History, Management and Recommended Varieties of Peonies in the Peace River Region*. Agri.Can., Beaverlodge, AB. NRG 90-09b (rev.). Reprinted, plus 3 photos, in Amer. Peony Soc. Bul. no 280, pp. 22-34.

3. Fearnley-Whittingstall, Jane. 1999. *Peonies: The Imperial Flower*. Wiedenfield and Nicolson, U.K. 384 pp. Paperback ed., Seven Dials, Cassell and Co., U.K.

4. Fox, Robin Lane, 2010. *Returns from China*. Pp. 127-130 in Fox, R.L., *Thoughtful Gardening*. Basic Books, Perseus Books Group, N.Y. 345 pp.

5. Harding, Alice. 1917. *The Peony*. Reprinted 1993 with foreword, updated and additional appendices, and color photographs by Roy G. Klehm. Sagapress Inc./Timber Press, Inc., Portland, OR. 145 pp.

6. Hollingsworth, Don. 2009. *Peony Flower Anatomy*, Parts I, II, III. Amer. Peony Soc. Bul.s 349:1-5; 350:1-10; 351:1-5.

7. Page, Martin. 2005. *The Gardener's Peony: Herbaceous and Tree Peonies*. Timber Press, Portland, OR., 267 pp.

8. Porter, Brian. 2012. *'Garden Treasure' Peony. The Gardener for the Prairies*, Spring 2012 v.18, Issue 1, p. 28

9. Rogers, Allan. 1995. *Peonies*. Timber Press, Portland, OR., 296 pp.

10. Stern, R.C. 1946. *A Study of the Genus Paeonia*. Royal Hort. Soc., London, U.K., 155 pp.