Plant Patents: A Potentially Extinct Variety

DONALD G. DAUS[1]

The abolition of plant patents was recommended by the President's Commission on the Patent System in its recent report. However, the bills introduced in Congress (S. 1042 and H. 5924) to implement the report did not include this for lack of time for "further study to determine the most appropriate means of protection."

Since a reappraisal of Plant Patents can be expected in the near future, it is appropriate to explore the actual and potential scope of the existing law.

This paper will delineate the legal and taxonomic bounds of the plant patent law. For perspective, limited comparison to other nation's laws is provided.

Since adequate descriptions of procedures for obtaining plant patents are available elsewhere (8, 14), this aspect is not discussed.

Historical

Although patent laws are of ancient origin (since 1474 in Venice), plant patents are a recent development.

On February 11, 1930, identical bills were introduced in Congress by Hon. J. G. Townsend of Delaware and F. S. Purnell of Indiana.

After prompt committee hearings, the modified bill was passed May 12, 1930 and signed by President Hoover on May 23, 1930, becoming the Townsend-Purnell Plant Patent Act of 1930.

The demand for patent protection came primarily from rose and fruit tree breeders. In both these fields only asexual propagation is of commercial importance. Opposition came from the farmers who propagate by seeding, only "Irish" potatoes being cultivated asexually. Congress compromised, establishing the patentability of asexually reproduced plants exclusively, but excluding potatoes. The United States Department of Agriculture supported and the Patent Office initially opposed plant patents.

Although called the "Plant Patent Act," it is wholly supplementary to the laws relating to patents of invention and designs. This law was the first expressly to permit the patenting of plants.

The provisions remained unchanged until January 1953, when the general patent law was codified, the plant patent parts becoming Title 35 United States Code, Sections 161 to 164.

On September 3, 1954, Section 161 was amended to clarify a question raised by the Patent Office Board of Appeals. The Board had ruled that discoveries of wild plants in uncultivated areas were not included within the language of the Act and could not be patented. Previously, many such plants had been patented. The amendment specifically excluded plants discovered in an uncultivated state, impliedly imparting patentability to plants discovered in cultivated areas.

As amended, 35 U.S.C. states:

> §161 Patents for Plants
> Whoever invents or discovers and asexually reproduces any distinct and new variety of plant including cultivated sports, mutants, hybrids, and newly found seedlings, other than a tuber propagated plant or a plant found in an uncultivated state, may obtain a patent therefore, subject to the conditions and requirements of this title. . . .
>
> §162 Description, Claim
> No plant patent shall be declared invalid for noncompliance with section 112 . . . if the description is as complete as reasonably possible. . . .
>
> §163 Grant
> In the case of a plant patent, the grant shall be of the right to exclude others from asexually reproducing the plant or selling or using the plant so reproduced.

[1] Examiner, United States Patent Office. The opinions expressed in this paper represent personal views and not the official view of the United States Patent Office.

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Section 162 recognizes that words cannot precisely describe attributes as fragrance, color, etc., and excuses plant patents from strict requirements of precision and clarity. Section 164 (omitted here) provides for assistance to the Patent Office by the Department of Agriculture.

The stated purpose of the Act was to afford agriculture and horticulture, so far as practicable, the same opportunity to participate in the benefits of the patent system that had been given industry, hoping for the discovery of plants that would revolutionize agriculture, as had inventions in steam, electricity and chemistry. Since asexual reproduction is required and since tuberous plants, particularly potatoes, are unpatentable, a large portion (on a dollar value of crop basis) of the economic plants are excluded from this hope.

An unsuccessful attempt to remove the "potato exclusion" was made in 1959. The Patent Office supported the removal; the Department of Agriculture opposed it, in accord with its policy of not patenting any plants derived from Department of Agriculture research. A governmental agency has no need for patent protection. When the agency develops processes that require no major expenditures to commercialize, the users do not require patent protection. Patent protection is needed primarily to attract venture capital (3).

The Economic Impact of Patents

There are at least two objectives of the United States Patent System: 1) prompt disclosure of ideas and discoveries, and 2) encouraging commercial utilization of these to provide consumable products. From an economic view, the latter is the controlling factor, both in dollars contributed to gross national product and availability to the consuming public of products which might not otherwise be accessible. This is done by protecting the innovator with a monopoly for a limited time—17 years—against the uncontrolled competition of those who have not taken the initial financial risk. This financial risk refers to development costs and is not limited to costs of discovery.

Disclosure of ideas, without more, has limited economic impact. Commercial availability is not automatic. For example, penicillin was described in 1929. No one invested money for commercialization for a decade. At that time, medicines were not patentable in the United Kingdom. No one took the uncertain risks. Without patent protection, entrepreneurs are less likely to invest if patented or otherwise protected alternatives are available. The decline in the fermentation solvents industry relative to synthetic solvents after denial of patent protection to culture bacteria has been noted (3).

The grant of a patent has been compared to homesteading of land to provide incentive to develop it (2). In some nations (not the United States), the analogy extends to a requirement that a patent be "worked" or else forfeited.

Robb (8) has reported that seven to ten years are required to develop a new rose to market at an expense of $50,000 to $100,000 for breeding and promotional costs.

Rose bearing plants constitute about half the plant patents granted. Wuesthoff (15) notes that prior to the act, 90% of the roses sold in the U. S. were imported. By 1956, this was down to 10%. At the least, this one industry has been encouraged by the Plant Patent Act. Since this industry was the initiating force, the Plant Patent Act cannot be deemed unsuccessful.

The Rights of the Plant Patentee

Under the Constitution, Article I, Section 8, Congress has the power "to promote the progress of science and useful arts" to secure "for limited times to authors and inventors the exclusive right to their respective writings and discoveries." "Exclusive right" is interpreted as the rights to exclude others from making, using or selling the patented item. The three basic rights have been held to be separate and distinct rights. Each individual act of unauthorized manufacture, sale or use is a distinct infringement of the patent. The patentee enforces his grant by civil suit for money damages. In one case, infringing plant material was ordered destroyed.

Experimental use is not usually infringement.

Section 163 substitutes asexual reproduction for making in order to satisfy those who feared that such reproduction of a plant might not be construed as a "making"

of the invention since nature plays a vital role in the making of a plant (1).

It is contended by some that a plant patent covers only a plant reproduced from the original, an actual descendant, a clone. If Congress so intended, it would have expressly limited the scope of protection (1).

The test of infringement is not asexual reproduction but substantial identity of the plant, as set out in the "claim" of the patent. A clone of a mutation that lacked the characteristic of the claimed plant would not infringe. The owner of a plant patent does not obtain any right to reproduce the plant asexually or otherwise but merely the right to exclude others from using, selling, and asexually reproducing the claimed plant (1). The patent does not cover parts of plants, as seed or fruit, thus sale of these cannot be prevented. However, growing the seed would be infringement, if the seedling shared the claimed characteristics. It should be noted that "plant varieties that produce true to seed are not patentable" (14).

Since the claim language may not adequately describe such characteristics, a practical problem of proving identity exists, except where actual descent is shown. One writer has proposed that the alleged infringer should bear the burden of showing an independent source (6).

The authorized sale of a patented plant carries an "implied license" to use it for its normal utility and function. It is clear from the legislative history of the Act that Congress intended that a plant patentee would be able to control the plant's asexual reproduction, that is by budding, cutting, layering, division, and the like. The language appears to exclude "asexual seeds" (apomicts), as in citrus.

There has been remarkably little litigation of plant patents. Thus the precise meaning of the Act has not been extensively construed.

The "Product of Nature" Doctrine

A plant discovery resulting from cultivation is presumably unique, isolated and not repeated by nature nor reproducible by nature unaided by man. Such discoveries can be made available to the public only by encouraging those who possess the single plant to reproduce it asexually (to insure genetic identity) and thus to create a supply (14).

The general patent law does not permit grant of a valid patent on a so-called "product of nature," since no inventive act can be presumed. Plants found in an uncultivated state cannot be presumed to have been created by other than nature.

Prior to the Plant Patent Act, this doctrine barred the patenting of plants.

Oranges with rinds impregnated with borax were held not to be new articles of manufacture and, therefore, unpatentable as products of nature (*American Fruit Growers* v. *Brogdex Co.* 283 U.S. 1). Aggregations of six strains of *Rhizobium* were held unpatentable (*Funk Bros. Seed Co.* v. *Kalo Innoculant Co.* 333 U. S. 127), where each strain retained the effect previously possessed, no strain acquired a different use and the combination produced no *new* bacteria. Interestingly enough, the Supreme Court did not hold bacterial strains unpatentable in all situations.

There can be nothing operable that is not ultimately a product of natural forces. This legal doctrine is not normally invoked where the invention's characteristics are not previously known or where an unexpected or unexpectedly improved result is obtained.

Patentable Plants: Scope and Limitations

A plant sought to be patented must meet certain legal requirements. The plant variety must be new (previously unknown) and distinct. New and distinct varieties fall roughly into three classes: 1) sports, 2) mutants, and 3) hybrids (14). Sports or chance seedlings are the most common plants patented (10).

Newness of the plant is determined by the Department of Agriculture, which reports its opinion to the Patent Office, which then ultimately renders a decision on patentability. This opinion must be supported by specific reference to known varieties (14).

The legal significance of the word "variety" in the Act has not been construed. The term has been defined by the International Code of Nomenclature for Cultivated Plants (Art. 5) as "an assemblage of cultivated individuals which is distinguished by any characters (morphological, physiological, cy-

tological, chemical or others) significant . . . which when reproduced . . . retains its distinguishing features." Varieties of asexually reproduced crops are called clones (Art. 11).

The characteristics which may distinguish a new variety include, but are in no way limited to, immunity from disease, resistance to cold, heat or drought, color of flower or fruit, fragrance, form and ease of asexual reproduction. No example is seen, as yet, of a biochemical characteristic, as increased or decreased alkaloid or enzyme content, as a basis for plant patentability.

The plant must be asexually reproduced prior to application for a patent, but must not be available to the public more than one year before applying. An unrecognized variety is not considered available. Implicitly, the distinctive character must be retained by the clone.

The ability to produce seeds does not preclude patentability, unless such varieties are "true to seed." This exclusion is not unreasonable. Since less time is needed to develop marketable supplies for seed propagation, the need for 17 years protection would be reduced. Since variation would be greater, particularly where the variety is heterozygous, proof of infringement would be more difficult.

The Act explicitly excludes plants asexually reproducible by tubers, the legislative history specifying the Jerusalem artichoke (*Helianthus tuberosus*) and the Irish potato (*Solanum tuberosum*) on the theory that these tubers are the edible portions and a patentee could or should not enforce his patent against all who buy the tubers in the market (1). This is an illogical exception, particularly in view of the extensive grant of plant patents (over 25%) for fruit bearing varieties.

The term "tuber" is interpreted in its strict botanical sense, as meaning a short thickened portion of an underground stem, as opposed to bulbs, corms, stolons, and rhizomes (13).

Sweet potato vines, *Ipomoea batatas,* are outside the exclusion, since the edible portion is a fleshy root. None, however, are patented. There is some question as to patentability of the Taro, *Colocasia esculenta,* and of *Dioscorea,* the latter a potential source of steroids.

In contrast, the word "plant" has been interpreted by the Court of Customs and Patent Appeals as meaning the popular, non-technical sense and excluding bacteria. *Clostridium,* used for acetone fermentation, were held unpatentable under the Plant Patent Act in the decision *In re Arzberger,* 112 F.2d. 834. The correctness of the decision has been recently questioned (3), since the purpose of the Act was to aid agriculture and since an industrial bacterial fermentation consumed major quantities of materials of agricultural origin.

A major research endeavor of the United States Department of Agriculture is developing microbiological processes for utilizing agricultural products.

Although "Mushrooms," *Agaricus,* had been patented both before and after the Arzberger decision (Pats. 27 and 2050), the status of less complex fungi as *Penicillium* is unclear. Neither patents nor published decisions contrary are available. A logical rationale resolving the "Mushroom" patents and the Arzberger ruling would be difficult. *Penicillium* breeding contributed the major factor in reducing costs of penicillin. Apparently, since the pioneer selection was done by the Department of Agriculture its policy of not patenting plant material may explain the absence of patents. The drastic reduction in penicillin cost by strain selection and X-ray mutation is one of the most spectacular economic feats of plant genetics. This government-financed breakthrough occurred a decade after discovery of the drug.

The commercial strain of the bacterium that produces chlortetracycline, *Streptomyces aureofaciens,* is not patented. The patent on the antibiotic itself expires this year; the bacterial culture deposited on applying for the patent was not a commercial strain. To counter part of the alleged tetracycline conspiracy, the Federal Trade Commission is seeking an order requiring these commercial strains to be made available. It was not until the culture was stolen that infringement of the patent was possible. It is ironical that the public cannot commercially practice an expired patent because one element was not itself patentable.

Relatively few gymnosperms have been

patented. Two varieties of *Ginkgo biloba* have recently been protected (Pats. 2,675 and 2,726). These are the most primitive seed bearing plants patented.

No algae have been patented under the Plant Patent Act, although there is no apparent reason to expect them to be unpatentable. Since research is underway selecting algal strains for life support systems or possible foods, applications on these may be attempted. Since algae are closer to the "popular" concept of plants than are bacteria, the Arzberger decision is probably not a legal bar. The asexual reproduction can be met by the use of an agitator which shears the filaments or colonies, thus dividing them (3).

About 75% of plant patents are drawn to members of Rosaceae. Half are to rose bearing varieties, one quarter more to other flowering ornamentals and one fifth to edible fruit bearing varieties, chiefly peach trees. One carnation mutant resulting from atomic radiation has been patented (Pat. 1,481, one of the very few government owned plant patents).

The remainder include one tobacco (Pat. 412), bent grass, *Agrostis* (Pat. 1,924) and blue grass, *Poa* (Pats. 2,364, 2,513, and 2,615) as well as various ornamental evergreens. The patenting of blue grass has been noted as a possible new trend (16).

Among the very few non-ornamentals having industrial utility are sugar cane and poplar trees(*Populus*) the distinctive characteristic of which is ease of pulping (Pats. 207, 211-8, 225-30 and 365). Few purely ornamental trees have been patented (5), although activity appears to be increasing.

Trends

The approximately 2700 issued United States Plant Patents comprise less than 1% of all patents granted. Their scope is narrower than other patents, but the probability of a grant is greater; only a little less than 10% of the applications being unsuccessful.

The tabulated data are uncorrected for changes in Patent Office backlog. Correction would tend to reduce the apparent percentages allowed.

The rate of plant patenting has slowly increased. In the first 14 years, less than 0.1% of the patents granted were for plants (7). Between 1961-5, the relative percentage is slightly more than twice that, in a period of increase in total patents granted. Fifty-five plant patents were granted in 1948; 129 in 1963, an increase of 130% in the absolute rate of issue. The recent increase in Patent Office fees would be expected to slow this rate since some individuals may be deterred by the increased cost.

Most plant patents are assigned to nurseries. Few are owned by industry or universities, which is unusual in view of their great interest in patents of invention. The latter have either not considered the opportunity or determined that the narrow scope makes plant patent protection uneconomic.

Potential areas of plant patent activity are algae, herbs having useful but complicated alkaloids, as those of *Vinca rosea,* lawn sod, and slash pine with increased oleoresin content. Unpatented but eligible varieties include garlic, bananas, pineapple, and certain palms.

Possible areas of interest include new strains of ergot (*Claviceps purpurea*) suitable for submerged culture in industrial fermentors and the use of specially adapted plant strains for the removal of nitrate pollution from water.

Laws of Other Nations

The United States was the first to provide special patents for plants. Two nations whose patent laws are closest to the United States have not followed the example.

The Republic of the Philippines, the pat-

TABLE 1

Patents	Applications filed 1961–5	Patents granted 1961–5	Percentages allowed (uncorrected)
Invention	436,082	259,971	59
Design	25,251	13,862	55
Plants	628	576	92

ent law of which was once identical, does not have these special provisions. The possibility of a change is "remote."

Canada's patent law is a unique blend of British and United States concepts. No plant patents are permitted. A 1960 Royal Commission considered but expressly rejected the concept of plant patents. This was primarily on the concern that Canadians would have to pay royalties on American varieties, (United States Patents have no legal force beyond its frontiers) which would far outnumber the expected number of varieties of Canadian origin. 95% of Canadian patents are granted to foreigners. The Commission questioned the value of rose varieties to their economy (10).

Since 1952, the Republic of South Africa has provisions similar to the United States. Most South African plant patents are to roses, mostly of foreign origin.

The British law is said to exclude plant patents. A single exception exists, British Patent 458,388, drawn to a poplar tree which corresponds to 13 United States plant patents. This illustrates the narrowness of United States plant patents, which are permitted to have only one claim each.

In France, Italy, Belgium, and Luxembourg patents are granted on all plants, not merely those asexually reproduced, under their general patent laws. Since patents in these nations are granted without examination as a matter of applicant's right (except in France on medicinals), a patent in these countries does not carry any implication of inventiveness. In France, patents carry the warning "without guarantee of the government."

In (West) Germany, plant patents are granted under the general patent law. There is no limitation to asexual reproduction; one of the first German patents to plants claims a pea (15). Since 1953, Germany also had a seed registration law "Saatgutgesetz," which excludes ornamentals.

There is a pronounced trend in Europe towards granting an alternative form of protection called "Breeder's Rights." Fejer discusses the problems of Breeder's Rights (4).

An international agreement, the Convention of Paris for the Protection of New Varieties of Plants, was drawn up in 1961, providing that each signatory nation will establish a system of variety protection for at least five genera when the Convention becomes effective. Belgium, Denmark, France, Germany, Italy, the Netherlands, Switzerland, and the United Kingdom are signatories (11). Weiss doubts that the United States will participate (16).

Gradual implementation is expected: wheat, barley, either oats or rice, corn, potato, peas, beans (*Phaseolus vulgaris* and *P. coccineus*), alfalfa (*Medicago sativa* and *M.*

TABLE 2

Nation	Plants patentable	Type	Reference
Belgium	Yes	General	(15)
Canada	No	———	(10)
Czechoslovakia	No	———	(13)
France	Yes	General	(15)
Germany	Yes	General	(15)
Israel	No	———	(13)
Italy	Yes	General	(15)
Luxembourg	Yes	General	(15)
Morocco	Yes	?	(10)
Netherlands	No	———	(13)
Philippines	No	———	
Portugal	Yes	?	(15)
Russia	No	———	(13)
South Africa*	Yes	Asexual only	(15)
Tunisia	Yes	?	(10)
United Kingdom	No	———	(13)
United States	Yes	Asexual only	

*Since receipt of the manuscript South Africa has ceased to grant plant patents (cf. Bull. Amer. Law Assn. 1967: 244).

varia), red clover, rye grass, lettuce, apples, and either roses or carnations are embraced.

The effect of the "Breeder's Right" is that prior authorization shall be required for production for commercial markets of the reproductive or vegetative propagating material (including whole plants) of the protected variety (Art. 5 of the Convention). Utility (meritorious performance) is not required for conventional breeder's rights. The rights are positive, as compared to the patentee's right to exclude (16).

A trend toward international adoption of plant patents is not evident. The Model Code for Developing Countries, Section 5 (12) expressly rejects plant patents. It is unlikely that developing countries will adopt them.

Conclusions

Plant patents serve a definite purpose for the horticulture industry. To this end, their continued existence is justified.

The great hopes for agriculture have not been realized, possibly by the illogical exclusion of the potato, one major economic plant otherwise within the scope of the Act, and possibly by the judicial exclusion of bacteria, the use of which in acetone fermentation was a once significant consumer of agricultural products.

The plant patent gives its owner the right to exclude others from selling, using, and asexually reproducing the protected variety.

A few major nations have adopted this American innovation. Many prefer a second form of protection: Breeder's Rights. Lack of international homogeneity is characteristic of national patent laws.

The full taxonomic spectrum of potential coverage has not been utilized, 75% of the varieties being Rosaceae.

The emphasis has been on ornamentals rather than varieties (other than fruits) with agricultural or industrial impact. The United States Department of Agriculture has been active in the latter endeavors and has a policy of not patenting plant material. Little change can be expected.

University and industrial organizations have little utilized a possible opportunity.

The existing law should be retained and perhaps broadened to include bacteria and potatoes.

Thomas Jefferson once summarized: "The greatest service which can be rendered to any country is to add a useful plant to its culture." The incentive for this addition should be retained.

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