

Capers: from wild harvest to gourmet food[©]

B. Noone^a

Caperplants, Adelaide, South Australia, Australia.

INTRODUCTION

In this presentation I would like to introduce the caper plant, known generally as *Capparis spinosa*. This botanical name is complicated and a source of debate amongst botanists. Suffice it to say that the capers you buy in the shops around the world will come from 6 different species of *Capparis*.

I will talk about how I became involved with capers, and this will lead to a discussion of the propagation of this plant, its difficulties and solutions. Finally I will talk about the future of this plant both locally and overseas.

DISCUSSION

The caper plant

The caper plant is a small shrub (Figure 1), which is harvested for its flower bud (the caper) and its fruit (the caperberry), which develops from the flower. To a lesser extent, young leaves and stems are harvested in early spring.



Figure 1. Caper plant.

The caper plant, *C. spinosa*, is described as a perennial deciduous plant and it will live for 30-50 years. The caper plant is a low shrub, with many branches growing from a basal root. If they have not been pruned, the branches will continue to grow longer and develop more side shoots or branchlets. As the weather warms up in the spring and summer, many branches start to emerge from the basal root if the plant has been pruned in the late autumn or winter.

When the branches are about 30 cm long they start to produce flower buds (Figure 2),

^aE-mail: brian@caperplants.com

which are the capers. Each branch continues to grow longer and produce more flowers, especially if the capers are picked regularly. The branches, normally not woody enough to stay upright, will bend over and lie on the ground, but continue to grow longer. The prostrate growth produces a carpet effect, which acts like a mulch to conserve water. The bushes can grow to about 1 m in height. In a cultivated situation, the bush will grow to a width of 3.5 to 4 m over the summer season.



Figure 2. Caper flower and flower buds.

Most species and taxa of caper plants produce thorns or curved spines at the leaf axil under the leaf branch or pedicel, which become woody and sharp. This is a serious problem for pickers. The variety without spines, known previously as *C. spinosa* var. *rupestris*, and now as *C. orientalis*, grows around the Mediterranean, in places like the islands of Pantelleria, Salina, and Lipari. This is probably the parent plant of the thornless caper plants that have been developed in Australia, Argentina, and Uruguay.

The young leaves of caper plants are structurally and physiologically different from the mature.

Caper plants live in conditions of high irradiation and high temperature. The leaf structure is unique to absorb the intense sunlight and to photosynthesize and grow. They are able to keep thriving in very hot and dry conditions, while most plants lose their leaves and die.

Climatically, the caper plant grows best in well drained soils and in hot dry conditions. They can withstand temperatures higher than 40°C. They respond well to good winter rains. They do not like waterlogged conditions as mature plants. Caper plants develop extensive and deep woody root systems. Some researchers have discovered roots 6-10 m long.

The caper bush is normally deciduous in the winter; it is salt tolerant and they can survive on poor soils and in areas with only 200-mm annual rain. They are well described as “drought tolerant” and are used in many countries and United Nation programs for reforestation and for fighting soil erosion.

Propagation

The story of capers started for me in the early 1990s with a seed catalogue, and the thought that we grew all the other so-called “Mediterranean diet” plants, such as tomatoes,

olives, basil, parsley, grapes, almonds, and pistachios. So why didn't we grow capers in the warm Mediterranean-like parts of the world, as a domesticated home garden plant? It wasn't long before I realized that one of the reasons why we didn't grow real capers was that it was very hard to propagate caper plants, either from seed or from cuttings. Secondly, capers prefer a hot dry climate.

In 1995 I purchased some caper seeds from a herb seed catalogue, and I successfully germinated a few plants. I thought that I needed to learn how to grow these interesting plants, and naturally I planted them in our large herb display garden. At the time my partner, Julia, and I owned and operated a wholesale herb nursery. This garden was overhead watered, and eventually I realized that caper plants did not like this. So I moved them in the winter to the back of our nursery and put them in a row with lavenders in the full sun with no automatic watering. They thrived.

I quickly realized that there was great variation in each individual plant. Some grew upright, and others prostrate. Some had reddish stems, some pale green stems; the leaves of some turned purple earlier in the autumn, and most importantly, some produced more capers (flower buds) than others.

Living in Australia, there was no local information about capers, and no local knowledge on how to propagate and grow them. In 2002, I successfully applied for a Churchill Scholarship to study caper growing in the Mediterranean region. So Julia and I headed off to Morocco, Italy, and Spain, to witness how capers were grown, harvested and processed. We are indebted to the Churchill Trust for providing this important service. My report on this trip can be found on the Churchill www.churchilltrust.com.au/fellows/reports/agriculture/horticulture/.

Back in South Australia, just north of Adelaide, we applied new knowledge to our endeavour to grow and provide good caper plants and enjoy capers in our cooking. Growing caper plants from seeds was no guarantee of good plants. Valuable years can be lost to produce a plant of poor quality. Nobody really grows grapes or oranges from seed. As with growing peaches, grapes, lemons, and many other fruits, we needed a proven taxon. We needed thornless caper plants that had a longer season of flowering, which would produce more capers. We needed a bush that produced more capers on each branch and more capers every 10-12 days. Another important requirement was the capacity of the bush to produce a caper with good flavor and taste.

We experimented over many years. We grew over a 100 caper plants, and over time measured each one for the needed qualities. Every time we picked, we weighed the amount of caper each bush produced and we counted the number of branches. We recorded when they started flowering and when they stopped, photographing everything.

The 'Eureka' caper plant stood out. It produces more with good flavour. It has a longer season of flowering, and more capers on each branch. This 'Eureka' cultivar, *C. spinosa* var. *rupestris* 'Eureka', was successfully registered with IP Australia² under the Plant Breeder's Rights (PBR) legislation, in 2008.

The real hurdle was still to come...how to clone this special caper plant? Nobody had successfully done this anywhere in the world. There had been some success with tissue culture in Italy and in Queensland, Australia, but not commercially. Again there had been minor success in Israel with propagation from cuttings. The old Italian practice of taking about five cuttings from a plant at the end of winter offered no real solution.

I collected and prepared many cuttings, and twice arranged for commercial nurseries to "mind them" for me in commercial propagation hot houses while they rooted, but these efforts were not successful. The challenge was to clone the plant. The next step was to build a propagation house to cater for the particular requirements of capers.

Although the caper plant can endure long drought, the cuttings, with no roots, require an exact amount of water to keep them alive, without becoming too wet. Caper plants generally don't like water and humidity, and have little inclination to develop roots. These requirements present a challenge to the process of cloning. Some overseas research and experience has helped, and I believe that we have achieved a successful result.

Because the caper plants grown from seed are not true to form, the need to clone a

good cultivar is essential. From my research, it is indicated that only 30-40% of seedlings are of any value. It will take up the 4 years for a plant to mature, and years are wasted if 60-70% will not produce a reasonable harvest. Some early releases of caper plants in Australia were from seedling and some nurseries, still today, are disappointedly selling seed-grown caper plants to home gardeners and commercial farmers.

In its natural environment, the caper plant has no inclination to propagate itself vegetatively. In fact, its sexual reproduction, with great variation, has evolved to successfully survive and adapt to new environments.

My first attempt at cloning was close to a perfect failure, but one plant grew roots proving it was technically possible.

Pantelleria caper farmers, who have a cooperative to process and market their produce, had traditionally kept five branches on the deciduous winter plant, and used these for cuttings in the early spring. They had a degree of success, but their farms are dotted with uneven size bushes and different productivity.

The success of cloning the caper plants comes from understanding the plant.

- Its leaf/root structure
- Its water holding ability
- Its turgidity
- Its environment.

I had to throw away many of the conventional parameters advocated by textbooks on propagation. The caper plants survive in a high level of light radiation and subsoil moisture for roots. They do not like to dry out and their water holding capacity needs to be highly controlled. They do not like cold or humid conditions.

I established my own propagation house and I have had to establish an environment:

- That allows for a higher level of light than usual (One year I thought that the plants were drying out from the sun, and introduced shade curtains—this was disastrous.)
- That very carefully keeps the leaves from being too wet or too dry (This of course is a traditional propagators problem). The experts talk of “leaf water relations” and the “water and solute potential.”)
- The concept of temperature differential is doubtful in this situation.
- Both aerial parts and the root zone require a higher level of temperature, where other plants would not dare to go.
- Extra light radiation is provided at night for a limited period.
- An experiment in blue and red LED light was inconclusive, but I will try again in a tissue culture laboratory.
- With a need to remove any hint of humidity above average by air exchange or working in a hot dry climate like Adelaide. (The removal of humidity by using an air conditioner did not work, as it introduced a colder environment which caper plants do not like.)

Some useful tools.

- The UK publication by HDC “Hardy Nursery Stock Propagation Guide”, which is a record of the UK nursery industry’s practices, was very helpful.
- The UK mist controller called ‘Evaposensor’ totally brilliant, which responds to humidity, wetness, radiation at the leaf level.
- Japanese secateurs, which contains no spring, but gives the user double control with your hand, and thus full control over the cut.
- I was also helped by IPPS members, and their useful advice.

The caper plant is the latest addition to the so-called Mediterranean diet. It is a perfect home garden plant for a large part of Australia, but not the coastal parts of Queensland because of high water and humidity, and Tasmania because it is just too cold, although parts of Tasmania are dry.

COMMERCIALLY

Caper farming will struggle in Australia because of labour costs and cheap imports of caper products from countries with cheap labour, e.g., Morocco, Turkey, and others.

Many countries are trying to establish a caper industry because the market is there.

Nearly all the reports and governments' investigations into the potential caper industry in many countries, have concluded that the industry required cheap labour, and well-chosen selections, thornless at least, and the ability to clone good cultivars. So far nobody has really solved this problem, and we have an opportunity here.

CONCLUSION

What I have done is to apply horticultural principles and practices to a wild plant. It is an attractive bush with beautiful and fragrant flowers and edible flowers buds, fruits, and young leaf shoots.

I have written a book on capers and it will be release later this year. You can preorder at this conference or through my web page: www.caperplants.com

Additional reading

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