



芍药种植技术要点综述

寒冷潮湿的春天之后，我们看到了许多灰霉病和疫病的发生，造成产量减少。杂交类型的芍药品种较少或根本不会受到疫病的影响。

疫病

在潮湿的环境中，通过伤口感染。真菌可以在植物组织和土壤中存活多年。第一次侵染可以通过作物的黑色叶片及脆弱叶片来识别。当春季疫病感染时，茎部会出现棕色或者灰黑色斑点。在这种情况下，黑色的枝条会生长出来，长度不会超过 10cm。感染后几乎无法去除，感染的地方很多时候会感觉像海绵一样的柔软，髓部呈深褐色和湿腐，堪萨斯和公爵夫人这 2 个品种是对疫病敏感的典型例子。为了预防疫病，从花朵出现到砍掉地上部分前的这段时间内，必须喷洒例如铜、Axidor，或者杀菌剂 Ranman Top（仅预防用）。

疫病与夜晚霜冻易混淆，有相似症状：花头死亡，出现黑褐色，花朵变干，头部开始向下弯曲。夜晚霜冻，在冻伤部位和健康组织的边缘，茎中会出现一个空腔。因此，可以很容易地确定疫病和霜冻之间的区别。叶线虫也可能是死亡花头的原因，但是线虫不会导致头部弯曲。

为了防止不必要地使用昂贵的杀虫剂，明智的做法是测试可疑植物是否存在疫病。

措施：

- 使用健康的根茎
- 良好的土壤结构
- 避免过分潮湿的土壤并确保充分排水
- 避免土壤高盐度
- 喷洒防灰霉病时，偶尔添加防疫病药。

肥料

开花后，施肥是极其重要的，叶子需要生长、完全成熟，从而为下一年花卉产量打下基础。花的形成在八月和九月。定期采集土壤、叶子样本，以便更好地了解植物的需求。

*芍药每年正常施肥（公斤/公顷）

氮：150 公斤/公顷

磷： P_2O_5 （五氧化二磷）100 千克/公顷

钾： K_2O （氧化钾）225 公斤/公顷

镁： MgO （氧化镁）100 公斤/公顷

*开花后施肥是为了促进下个年度花蕾的形成

- 钙，比如 Patenkali（主要成分：硫酸钾，加上硫酸镁，以及钾镁矾和无水钾镁矾）、Vivikali。
- 氮，最少 50 公斤。
- 镁（苦盐）

请注意，植物要有足够的水来吸收肥料。这一时期的干旱将损害下一年的花卉收成。

活跃的土壤非常重要；潮湿的土壤和正确的有机质水平对于提高上述肥料的吸收非常重要。

*开花后的有机肥料

对于沙质土壤，明智的做法是多撒 300 公斤的 Mix5。开花后，可以通过各种方式施肥。DCM 提供非常适合芍药种植的慢效有机矿物肥料。

灰霉病

灰霉病的控制是一个长期的事。特别是当开花后没有保护时，灰霉引起大问题。因此，喷洒防灰霉的药以确保切割造成的损害不会引起感染。喷洒时，加入一些苦盐以使作物稍微变硬。在秋季，这种真菌形



成冬季孢子，在地面和空气的边界上冬眠。在春天，这也是感染开始的地方。在此期间，控制是必要的，但它从夏末开始。

杂草控制

多年生杂草的控制就像我们遵守纪律一样重要。早期管理非常必要，早期很轻的剂量就可以，否则，就不得不加重剂量，重剂量可能会对植物产生一些伤害。

黄单胞菌

芍药中一种相当新的侵扰被称为黄单胞菌，人们对这种细菌知之甚少。这种细菌如何在植物中繁殖和传播以及它如何在季节之间生存，我们都不知道。

当黄单胞菌发生时，会出现圆形的紫红色斑点。通常带有黄色圆圈。芍药杂交型品种，对黄单胞菌非常敏感。喷洒预防性杀菌剂 Serenade，或者喷洒使叶子增厚的页面肥料。在秋季，在砍掉地上部分以后，清除作物残留和杂草。



叶斑病

叶斑病在芍药作物中引起越来越多的问题。叶斑真菌和灰霉病在芍药上产生不同种类的叶斑。这两种真菌都在温暖潮湿的环境中繁殖很快，它们依靠作物残留物生存。

叶斑很容易与灰霉菌区分开来。下面罗列了灰霉病和叶斑病的症状。

*灰霉病

灰霉菌会出现浅棕色斑点，其中一半叶子或整片叶子很快被感染；感染通常位于叶子的末端，并从顶部开始蔓延；在潮湿的情况下，受感染的叶子上会有灰色的孢子团。

*叶斑病

斑点遍布整个叶子；斑点开始时为浅红色/深红色斑点；后来它们变成紫褐色斑点



叶斑病



灰霉病

措施：

- 使用健康的根茎。
- 砍掉地上部分后，清除作物残留物。
- 早上浇水，以便作物在夜间干燥
- 在温室中生长时保持低湿度。
- 喷洒预防性药物 Flint、Ortiva、或者 Swich，定期在这些产品之间切换使用，防止抗药性。

长脚绳的蛆

成年的鹤蝇吮吸一点点花蜜，但鹤蝇的幼虫，就是我们称之为“长脚绳的蛆”，会有更大的危害性。他们更大、更软、更平，吃各种不同的植物，包括芍药的地下茎。



鹤蝇的发展分六个发展阶段：

- 产卵期
- 四个幼虫期
- 一个成年期

成年鹤蝇只能活几天。有些物种每年有一代，但也有一些物种每年有好几代。这意味着幼虫可以全年造成危害。

白天，幼虫留在土壤中不动。晚上，它们出来吃植物的茎基部和植物下部的绿色部分。此外，他们将作物向土壤拖入一点点，被啃食过的茎会枯萎。

种植：

*准备期

- 采集土壤样本（确定主要元素、微量元素和有机质水平）和线虫样本。
- 选择性添加堆肥
- 排水非常好
- 没有带根的杂草
- 良好的土壤结构
- 感染过线虫的头茬作物及时杀离线虫。

*种植时间：

- 做一份种植时间表
- 室外种植：9月至来年3月（秋季最佳）
- 头、眼向上种植。
- 土壤结构、水平衡、整地非常重要。
- 整块地的排水性好。
- 湿润土壤中种植
- 种植后再喷一边水。

与 2-3 眼相比，3-5 眼有更好的投资价值。

2-3 眼和 3-5 眼花和茎的数量（以莎拉为例）：

年	茎的数量（枝）	
	2-3 眼	3-5 眼
2023 年秋季种植		
2024 春	0	0
2025 春	0	3
2026 春	4	7
2027 春	6	8
2028 春	7	9
2029 春	7	9
2030 春	8	9
	32	45



英文原文参考如下:

From GREENWORKS website

After the cold and wet spring we saw many cases of Botrytis and Phytophthora. As a result, there was less production. The Hybrid types seem to suffer less or not at all from the fungus Phytophthora. The cultivation of Peonies is not finished after the flower harvest!

Phytophthora

A quite new infestation in peonies is known as Phytophthora. An infection which takes place through injuries under humid circumstances. The fungus can survive in plant tissue and in the soil for years. The first infestation can be recognized through black and weak leaves in the crop. When there is an infection by Phytophthora in the spring, brown to gray black spots will arise on the stem parts. In that case the branches will come up like some sort of black brackets and they will not grow further than ten centimeters. After infection it is almost impossible to remove. Places of infection will most of the time feel spongy and soft, where the marrow will be dark brown and wet rot. Kansas and Duchesse are examples of species who are sensitive to Phytophthora. To prevent this, from the moment the flower rises till the mulching, you have to spray with, for example, copper, Axidor (works systematically), or the new fungicide Ranman Top (only works preventively).

It's easy to confuse Phytophthora with damage from night frost. In both cases the head of the flower dies, a black brownish color arises, the flower dries out and the head will start to bend down. With damage from night frost, on the brink of diseased and healthy tissue, a cavity in the stem arises. The difference between Phytophthora and night frost can therefore easily be determined. With a serious infection, leaf nematodes can also be the cause of dead flower heads, with the difference that the head doesn't bend. In that case, small, half-formed leaves can be seen. To prevent the unnecessary use of expensive pesticides, it is wise to test suspicious plants on the presence of Phytophthora.

Measures:

- Use healthy starting material
- Care for a good soil structure
- Avoid a soil that is too wet and ensure adequate drainage
- Avoid a high salinity of the soil
- While spraying against Botrytis, occasionally add a Phytophthora agent

Fertilization

After flowering, fertilization needs to be aimed on the vegetative growth of the plant, the leaves need to grow and fully mature. The crop which is now on the plant will form the basis of the flower production in the following year. The formation of the flowers will be in August and September. Take soil/leaf samples regularly and in fixed time periods, so that you will get a better view of the needs of the plant.

Normal applications of fertilization kg/ha for peonies on a year basis

(at normal soil values)

N- needs: 150kg/ha

Phosphate, kg P₂O₅: 100 kg/ha

Kali, kg K₂O: 225 kg/ha

Magnesium, kg MgO: 100 kg/ha

After flowering, fertilize for flower bud formation next season

- Calcium, apply halve (for example Patentkali or Vivikali)
- Nitrogen, minimal 50 kg
- Magnesium (bitter salt)

Be alert that enough water will be available for the plant to take up the fertilizers. Drought in this period will damage the flower harvest for the next year.



An active soil life is very important; moist soil and a correct organic matter level are very important to improve the absorption of the above mentioned fertilizer

Organic fertilizers after flowering

On sandy soils outside it is wise to scatter an extra 300 kg Mix5. Which compensates a part of the leaching. After flowering you can administer the fertilizers in various ways. DCM provides slow-acting organic-mineral fertilizers which fit perfectly in the peony cultivation.

Click [here](#) for all the information from DCM.

Botrytis control

Botrytis control in peonies is a long-term story. Especially when there is no protection after flowering, Botrytis continues to cause major problems. Therefore, spray against Botrytis to ensure that damage from cutting does not causes an infection. When spraying against Botrytis, add some bitter salt to harden the crop somewhat. In autumn this fungus forms winter spores that hibernates on the border of ground and air. In the spring this is also the place where the infection begins. During this period control is necessary, but it starts in late summer.

Weed control

Weed control in perennials is more a matter of discipline than choice of means. In weed control, almost only the organic matter content is important. A very heavy clay soil with little humus is therefore simply light soil for weed control. The effect of a product without damage is determined by the narrow line between effect and damage.

Symptoms

Leaf spots are easily distinguished from Botrytis. Below you will find a list of symptoms that occur in the case of Botrytis and leaf spots.

Botrytis:

- With Botrytis, a light brown spot arises at which half the leaf or the whole leaf quickly gets infected
- Often the infection is at the ends of the leaf
- It arises from the top
- Under humid circumstances there will be a gray spore mass on the infected leaf

Leaf spots:

- Spots spread on the entire leaf
- The spots start out as light red/crimson specks
- Later they become of focus-limited, purple brown spots

Measures:

- Use healthy starting material
- Remove crop residues after the mulching/mowing
- Watering in the morning so that the crop will be dry during the night
- Keep the humidity low when growing in a greenhouse
- Spray preventively with Flint, Ortiva or Switch. Switch regularly between these products to prevent resistance

Leaf spot diseases

Leaf spot diseases causes more and more problems in the crop of peonies. Leaf spot fungi and Botrytis create different kinds of leaf spots on the peony. Both fungi flourish under warm and humid circumstances and they survive on crop residues

Most resources work best in the first period after administration. If not sprayed at the right time, a higher dose is needed. However, this considerably increases the chance of damage. You can spray with a hood under the crop with Quickdown (does not work against grasses).



Xanthomonas

A quite new infestation in peonies is known as Xanthomonas. Little is known about this bacteria. Especially little is known concerning how this bacteria multiplies and spreads through the plant and how it survives between seasons.

When Xanthomonas occurs, round, purple-red spots appear. Often with a yellow circle. Hybrid species, among other things, are very sensitive to Xanthomonas. Spray preventively with Serenade or use leaf fertilizers to harden the leaf. And remove the crop residues and weeds after mulching in autumn. In connection with infection for the upcoming season.

Leatherjackets

Adult crane flies suck just a little bit of nectar. But the larvae of the crane fly, also known as leatherjackets, are much more voracious. They are relatively large, soft and fat and they eat of various plants. Including the stems of the peony just below the ground.

Way of life:

With the crane fly, six stages of development can be distinguished:

- One egg stage
- Four larval stages
- One adult stage

Adult crane flies live only for a few days. There are species which have one generation per year, but there are also species which have more generations per year. This means that the larvae are there year-round which can cause damage throughout the entire year.

Damage scenarios:

During the day, leatherjackets abide in the soil. At night they come up and eat at the stem base and lower green parts of the plant. Also, they pull the crop a little bit into the ground. Stems with a gnawed stem base wither.

New planting

Preparation:

- Take a soil sample (determine main elements, trace elements and organic matter level) and nematode sample
- Optionally add a compost
- Very good drainage
- Free of root weeds
- Good soil structure
- Previous cropping in connection with nematode infection
- Timely spray to death
- For orientation go to the auction and visit the plots where peonies are grown for the tubers (purchase for a longer time)

Time of planting:

- Create a planting schedule
- Outside: September – March (the best in autumn)
- Head/eyes set upright
- In connection with structure/water balance, soil preparation is very important
- Drainage of the land
- Planting in moist soil



- Consider spraying beds/sprouting flowers
- Possibly consider placing tunnels in the future (harvest dispersion/better profit)

When planting peonies in fall 2023; benefits of investing in 3-5 eyes compared to 2-3 eyes

variety	Year	Amount of stems		
		2-3 eyes	3-5 eyes	
Sarah Bernhardt	Planting in fall: 2023			
	Spring 2024	0	0	
	Spring 2025	0	3	
	Spring 2026	4	7	
	Spring 2027	6	8	
	Spring 2028	7	9	
	Spring 2029	7	9	
	Spring 2030	8	9	
			32	45