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Cultivation of Pineapple Plants (*Ananascomosus* (L.) Merr) in Switzerland

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Abstract
The climatic conditions Switzerland are unfavourable for cultivating pineapple plants. This is realised by pineapple plants requiring tropical temperatures to thrive and produce healthy fruits. In the agricultural sphere, pineapple plants can be propagated if the conditions for cultivation are favourable. However, in Switzerland, the cold climate has made the cultivation of *Ananascomosus* (L.) Merr. very difficult. It is only through human ingenuity that the cultivation of this plant has seen success in climates that would otherwise hinder the production of healthy pineapple fruits, like in Switzerland. This article will address many aspects regarding, and negating, to *Ananascomosus* (L.) Merr cultivation in Switzerland.

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Switzerland is a country that has a mountainous terrain and temperature climate. It is because of this that it may seem an unusual endeavour to cultivate pineapple plants (Singh, 2023). This is more so because pineapples (*Ananascomosus (L.) Merr)* are assocated with tropical climates - which are characterised by abundant sunlight and warm temperatures (Pegoraro *et al*., 2014). However, Swiss farmers have found a means of cultivating and growing pineapples in their temperature climate using advanced agricultural practices and innovative technologies (Singh, 2023).

The *climate* in Switzerland is such that the winters are cold and this leaves space for a relatively short growing season (Singh, 2023). This poses a great challenge in the cultivation of tropical crops like the pineapple (Singh, 2023). In order to grow pineapple plants properly, the climate must be warm with a high humidity so that the can flourish well in their habitat

(Mahmud *et al*., 2020). This temperate condition is absent in the Swiss landscape, and therefore the Swiss has found and adopted alternative methods of cultivating pineapple plants (read Singh, 2017).

Greenhouses are a key strategy used by the Swiss to cultivate pineapples in Switzerland (read Singh, 2017). These greenhouses allow farmers to maintain a controlled environment, like that in tropical conditions, so as to propage pineapple plants (Singh, 2011). This huge structure allows pineapples to be protected against harsh climates, thereby regulating the temperature as well as providing shelter for them from extreme climatic events (read Song et al., 2015; read Muhmud et al., 2018). Farmers are able to entend the growing season and optimize the growth conditions for pineapple plants by carefully managing humidity, light exposure and temperature in the Swiss landscape (read Singh, 2011; Singh, 2023).

In order to cultivate pineapple plants successfully, the choice of *soil* needs to be carefully selected as well as the preparatory processes used in soil cultivation are essential (Song, 2015; Muhmud *et al*., 2018). Pineapples prefer well-drained and nutrient-rich soil (Song, 2015). In Switzerland, farmers have to amend their native soil so that the substrate is suitable to grow pineapple plants (Singh, 2023). Furthermore, just as in ordinary farming practices, the application of fertilizers and organic matter are essential to ensure that pineapple plants develop and grow properly (d'Eeckenbrugge and Leaf, 2003; Lobo and Siddiq, 2007).

In the Swiss environment, a critical consideration is the *selection of the appropriate pineapple variety* (read Singh, 2011; Singh, 2023). This is because not any type, or not all, pineapple varieties are well-suited for cultivation in non-tropical climates (read Ramos *et al*., 2009; Song *et al*., 2015; Ferreira *et al*., 2016). It is a known fact that some pineapple cultivars are more suited to withstanding cooler temperatures and shorter growing seasons, and as a result, these are more suited for Swiss conditions (Singh, 2023).The ability of pineapple plants to adapt, the fruit flavour and size of the harvested fruit are all affected by the choice of pineapple variety chosen (d'Eeckenbrugge and Leaf, 2003; Lobo and Siddiq, 2017).

For the successful cultivation of pineapple plants, proper planting and cultivation techniques are used (d'Eeckenbrugge and Leaf, 2003). *Crown cutting*, also known as sucker removal, is one way in which pineapple plants are propagated (Singh, 2011). This technique required careful attention to be paid to the planting process and spacing (Singh, 2011). The initial growth phase requires careful and proper care in order to ensure that healthy plants are established and are tolerable to the challenges of the Swiss climate (Singh, 2011; Singh, 2023).

Watering, soil maintenance and pruning of the pineapple plants is an important *cultural practice* that encourages optimal growth of the pineapple plants (Singh, 2017). Farmers are equipped with the skill to ensure that the pineapple plants are properly aerated so that molds and other diseases don't plague the fruit (Song, 2015). This is essential although the fruits are housed in greenhouses with the well regulated temperature and humidy levels (Singh, 2011; Singh, 2017). The process of pineapple pruning is utilised to stimulate fruit development and to enhance air circulation between pineapple cultivars (read Hoosain and Rahman, 2011; Singh, 2011; read Pegoraro et al., 2014).

In Switzerland, pineapple cultivation faces many challenges regarding *pest and disease management*. Although the greenhouses have been found to provide a controlled environment for pineapple varieties, some pests and diseases can still thrive under these conditions and therefore integrated pest management strategies are essential (Singh, 2011). These integrated strategies use beneficial insects and the use of organic pesticides, instead of harmful chemical substances (Singh, 2011; Singh, 2023).

Pineapples also require harvesting at the *appropriate time* to ensure that the fruit is of optimal quality and taste (Pegoraro et al., 2014; Song et al., 2015; Muhmud et al., 2018). When the fruits are the right colour, size and aroma, it can be said to be ready for harvest (d'Eeckenbrugge and Leaf, 2003). By using the

correct harvesting techniques, damage to the fruit is minimized and the appearance of the harvest is maintained for proper transportation and storage (d'Eeckenbrugge and Leaf, 2003). Storage conditions and transportation methods are a type of post-harvest handing practices, and these practices have a profound effect on the shelf-life and overall quality of the harvested fruit (d'Eeckenbrugge and Leaf, 2003; Lobo and Siddiq, 2017).

There are several success stories regarding the cultivation of pineapple plants in Switzerland and this emphasises that it's possible to cultivate pineapples properly in the cold country. It is through *agricultural practices and innovate technologies* that Swiss farmers have overcome several limitations and achieved remarkable results. One method, as mentioned, that has produced impressive quality pineapples; is by means of using the greenhouse (Singh, 2023).

In Switzerland, pineapples are not only cultivated for agricultural purposes, but rather as a means to reduce the country's dependence on imported produce and contribute toward food security (Singh, 2023). Also, pineapples that are produced locally have good economic implications in that they foster growth in the agricultural sector, as well as, provide a means for job creation (Singh, 2023).

In conclusion, in Switzerland, pineapple cultivation is one approach that is successfully contributing toward agriculture. The use of greenhouses, advanced cultivation techniques and greenhouses have reduced the country's climate and topographical issues so that pineapples can even be produced locally. This emphasises a Swiss endeavour that shows human ingenuity of being able to overcome environmental limitations and the diversification of agricultural practices. Pineapple is a non-native crop of Switzerland, and while the Swiss explores new frontiers in agriculture, the potential of being able to grow this crop highlight scientific innovation in food production.

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