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'Senga Sengana' Strawberry

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'Senga Sengana' has had remarkable longevity for a strawberry cultivar. It was released in 1954 and still is the major cultivar grown throughout central and eastern Europe and in the Scandinavian countries (1, 7). The continuing importance of 'Senga Sengana' can be appreciated by the fact that it still accounts for 80% of the strawberries produced in Poland, the country second to the United States in world production. Between 70 and 80% of 'Senga Sengana' fruit is processed.

'Senga Sengana' has a fascinating history. It was released from the program of Dr. Rudlof von Sengbusch who began breeding strawberries in 1942, during the second world war, at the State Experiment Station at Luckenwalde, near Berlin, Germany (3). Dr. von Sengbusch had established his reputation as a breeder of rye, hemp, spinach, asparagus and lupin. The first alkaloid-free lupin cultivar was among his accomplishments. The decision to breed strawberries was based on the needs of the newly developed deep-freeze industry to have cultivars producing fruit suited to its purposes. None of the cultivars grown at that time in Germany met all of the industry requirements (9). The program was supported by the processing companies.

Dr. von Sengbusch screened all available cultivars for adaptation. Only one, 'Markee,' which was of American origin but named after the village where it was first grown in Germany, had any sort of adaptation (3, 9). However, the cultivar was quite unproductive and the fruit without aroma. It was subsequently used in crosses with various other cultivars, mostly of European origin, which were noted for greater productivity and produced more aromatic fruit. Approximately 40,000 seedlings from these crosses were planted in the field in 1944. In the following years, more than 75% of these were discarded because of poor vigor; fruits of those remaining were tested for deep freezing suitability. From these, approximately 1,500 were propagated and established in test plots at three locations each of which, like Luckenwalde, was in East Germany, at that time occupied by the Russian army. In 1948 the entire breeding program was relocated to Wulsdorf, near Hamburg in West Germany.

In 1949, the selection fields at Wulsdorf were severely infested with cyclamen (strawberry) mite, *Phytonemus pallidus* (Banks) (*Tarsonemus pallidus* Zimm.). All but three selections, were badly stunted by the infestations of the pest. The three selections originated from the cross of 'Markee' x 'Sieger.' 'Sieger' was an old German cultivar, released in 1987 from the cross of 'Kaiser Sampling' x 'Laxton's Noble.' One of the three was particularly productive with fruit considered ideal for freezing and other forms of processing. In 1954, the selection was introduced for commercial production in Germany under the name 'Senga Sengana.' (3, 9). At the same time, von Sengbusch founded the Sengana GmbH. company and assumed the position of president.

According to the original description, 'Senga Sengana' was midseason ripening with a comparatively short harvesting period lasting from 15 to 20 days (9). The relatively firm fruit, which maintained its integrity upon thawing, was described as having glossy, dark carmine red external and internal color,

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a heart to round shape, large to medium size, easily removed calyx and a sweet, mild flavor. All these traits were considered essential for fruit suited to processing. In addition, the fruit seemed suited to the local German fresh market, especially if harvested before full ripe without removing the calyx. The plants were described as high yielding with stable production from year to year.

Soon after its release, 'Senga Sengana' became the predominant cultivar in most European countries, including Germany, Belgium, Holland, Denmark, Norway, Sweden, Finland, Switzerland, Czechoslovakia and Poland and also throughout much of the then Soviet Union, including Estonia, Latvia, Lithuania, White Russia and the Ukraine. The cultivar was a major factor in the increase in strawberry production in all of these countries. For example, by 1978 Poland produced 200,000 tons of strawberries per year; most of this was from 'Senga Sengana.' This enabled the country to become one of the world's largest exporters of deep-frozen strawberry fruit, as well products such as juice, juice concentrate, puree, compotes and precooled fruit (10).

'Senga Sengana' proved to be productive in narrow matted rows, giving yields of 15 to 20 metric tonnes of fruit per hectare in the first year of production. Higher yields were often obtained in the second year. Plants remained vigorous and many growers were able to maintain plantings for as many as four years. Yields of other cultivars, including many introduced from North American breeding programs, did not equal those obtained from 'Senga Sengana' (1, 10). Initially described as ripening mid-season, it was subsequently described as mid- to late season (10).

Although suited to the local fresh market with an excellent fresh dessert quality, 'Senga Sengana' fruit proved to be unsuitable for long distance transport because it lacked a sufficiently high level of firmness and was susceptible to rot, caused by *Botrytis cinerea* Pers. ex. fr. (1, 4, 5). In recent years, the fruit has been further discounted for fresh market because it is smaller than that of newer cultivars. In Western Europe, in particular, 'Senga Sengana' has been replaced by cultivars, such as 'Elsanta,' which are better suited to long distance transport.

'Senga Sengana' is relatively resistant to two-spotted spider mites, *Tetranchus urticae* Koch. Although initially selected as showing tolerance to cyclamen mite, it will support relatively high populations of the pest. It is also tolerant to *Verticillium* wilt (*Verticillium albo-artum* Reinke & Berth).

The cultivar is relatively susceptible to preharvest rot, caused by *B. cinerea,* as well as to postharvest rot caused by the same organism (1, 4, 5). Its preharvest susceptiblity is probably influenced by the fact that most of the fruit are below the leaf canopy. 'Senga Sengana' is also susceptible to leaf spot (*Mycospaerella fragariae* [Tul.]) and to powdery mildew (*Sphaerotheca macularis* [Fr.] Magn.). However, in Russia it was reported resistant to the latter (4). This discrepancy might be due to the occurrence of different races of the causal organism. The cultivar is susceptible to red stele root rot, caused by *Phytophthora fragariae* Hickman (6). Other susceptibilities include reactions to two species of leaf and bud nematodes, *Aphelenchoides fragariae* (Ritz. Boz. [Christ.]) and *Aphelenchoides rizemabosi* ([Schwartze] Steiner).

'Senga Sengana' is well adapted to the soil and climatic conditions of eastern, central and northern Europe. It has also been grown successfully in the Atlantic Provinces of Canada (2). Plants grow well at relatively low soil temperatures. This has been attributed to their strong and deep root systems; roots reach the depth of two metres in established plantings. Plants usually do not show winter damage, even

when snow covering is lacking. However, in some exceptionally cold winters, with little or no snow cover, some crown damage can occur (7). Since flowering occurs relatively late and the inflorescences are below the leaf canopy, there is seldom damage to flowers or to flower buds from spring frosts.

The cultivar is an abundant runner producer. Thus, it is ideally suited to the matted row culture system. At same time, it is easily propagated.

There were many other cultivars released from Dr. von Sengbusch's breeding program, including 'Senga 29,' 'Senga 54,' 'Senga 188,' 'Senga Dulcita,' 'Senga Fructana,' 'Senga Gourmella,' 'Senga Jurica,' 'Senga Pantagruella,' 'Senga Precosana,' 'Senga Litessa,' 'Senga Tigajga' and 'Senga Gigana' (3). None had the long lasting impact on the strawberry industries of Europe that 'Senga Sengana' has had. The cultivar has also has had an impact in many breeding programs. It appears in the derivations of cultivars such as 'Kama,' 'Solveta,' 'Kristina,' 'Lina,' 'Melody,' 'Dagmar,' 'Fratina,' 'Frignetta,' 'Hiku' and 'Bounty.' These have, in turn, been used as parents.

It is likely that 'Senga Sengana' will remain an important cultivar well into the 21st century. This will make its life span even more remarkable and one that no other modern day cultivar can come close to matching.

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