

## ニホンナシの黒斑病耐病性突然変異

## Resistant Mutant to Black Spot Disease of Japanese Pear

ニホンナシの主要栽培品種の1つである‘二十世紀’はナシ黒斑病に罹病性であり、その防除には多大な労力が払われており、耐病性突然変異体の育成が望まれている。この黒斑病は病原菌 (Japanese pear pathotype of *Alternaria alternata* (Fr.) KESSLER) の感染により葉および果

実に黒斑状の病徴を示す。耐病性は1対の遺伝子に支配され、劣性ホモで耐病性、ヘテロで罹病性を示し、優性ホモ品種はみられないことが報告されている。

1962年、ガンマーフィールドに<sup>60</sup>Co線源を中心に53m (15R/日)~93m (4R/日)まで8m間隔に‘二十世紀’を定



第1図 ほ場条件下における耐病性突然変異体(左)と原品種二十世紀(右)。(1984年7月下旬撮影)

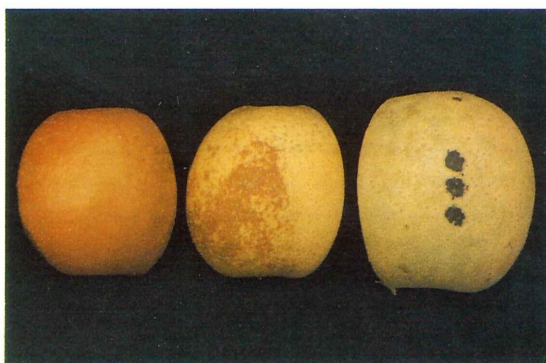
Fig. 1 Resistant mutant to black spot disease (left) and original 'Nijisseiki' (right) under a field condition.

(Photographed in late July, 1984).



第2図 第4葉に対する胞子接種後4日目の反応。耐病性品種長十郎(左)、突然変異体(中央)、原品種二十世紀(右)。突然変異体では二十世紀の黒斑点と異なる淡褐色の小斑点がみられた。

Fig. 2 Responses at 4th day after the inoculation to the 4th leaf of resistant cv. 'Chōjūrō' (left), mutant (center) and original cv. 'Nijisseiki' (right). Some small faint brown spots were formed in the mutant, which were different from the black spots.



第3図 果実に対する胞子接種後4日目の反応。耐病性品種長十郎(左)、突然変異体(中央)、原品種二十世紀(右)。突然変異体では二十世紀の黒斑点と異なるサビ状の小斑点がみられることがあった。

Fig. 3 Responses at 4th day after the inoculation to the fruit skins of resistant cv. 'Chōjūrō' (left), mutant (center) and original cv. 'Nijisseiki' (right). The russet-like blotches were occasionally formed in the mutant, which were different from the black spots.

植し、緩照射を続けた。1981年、殺菌剤の散布を行わず、無病徴の1枚を選抜した。1981年、この突然変異体をガンマフィールド外の実生台に接木繁殖して、変異性を検定した。1984年、7月上旬に原品種の‘二十世紀’は大半の無袋果に黒斑とキ裂を生じ、8月下旬には極端なサビ果を残し落果したが、突然変異体では9月中旬の収穫まで、葉、無袋果ともに黒斑病徴は認められなかった(第1図)。そこで、葉および果実に対する孢子および粗AK毒素の接種試験を行った。

各葉位に対する孢子接種で、耐病性品種である‘長十郎’は第2葉で20%に病徴がみられ、葉令が進むと病徴は認められなくなったが、‘二十世紀’では第2葉から第5葉まで100%と高い病徴の発現を示した。これに対して、突然変異体では第2葉で80%、第3葉で17%に病徴を示したが、第4葉以下の葉では病徴が認められなかった(第

2図)。9月12日に収穫した果実に対する孢子接種で、‘二十世紀’には明確な病徴が認められたが、突然変異体は‘長十郎’と同様に黒斑病徴は認められなかった(第3図)。

果実および第4葉に対する粗AK毒素接種を行った場合、‘二十世紀’では孢子接種に比べて果実の反応は弱いが、葉、果実ともに明らかに黒斑病徴が認められた。しかし、突然変異体では粗毒素が0.04～4ppmの濃度範囲で全く反応はなく、耐病性の‘長十郎’と同様の結果であった。

このように、突然変異体は原品種の‘二十世紀’とは明らかに異なり、耐病性傾向を示した。しかし、耐病性の‘長十郎’に比べると耐病性程度は弱く、突然変異体が周縁キメラであることに起因していると推察される。

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‘Nijisseike’ is one of leading cultivars of Japanese pear (*Pyrus serotina* Rehd.), which is known to be susceptible to black spot disease of Japanese pear. Therefore, farmers have prevented this disease by wrapping the fruit with a paper bag and by repeated spraying of fungicides. The disease, caused by Japanese pear pathotype of *Alternaria alternata* (Fr.) Keissler, is the most serious disorder. The susceptibility is controlled by a single dominant gene.

In 1962, the grafted trees of this cultivar were planted at 53 m (15 R/day) - 93 m (4 R/day) apart from a  $^{60}\text{Co}$  source in a gamma-field, and has been irradiated chronically. One branch on a tree planted at 53 m under the field condition was selected as a resistant mutant in 1981. Under the field condition, black spots were observed in many fruit and leaves of the original trees by natural infection in early July, however, they were not observed in the mutant (Fig. 1). In order to examine the degree of resistance of the mutant, the artificial inoculations were conducted by using spores of the pathogen and the host specific toxin produced from the germinating spores.

When some drops of the spore suspension were placed on the leaves, the formation of black spots depended upon the leaf age. Even in a resistant cv. as ‘Chōjūrō’, black spot symptoms were formed only when spores were inoculated on the younger leaf. However, an intermediate

reaction was observed in the mutant as compared with original ‘Nijisseiki’ which showed severe symptom on the 2nd to 5th leaf (Fig. 2). When inoculation on the surface of matured fruit skins, no black spot was formed in the mutant like the resistant cv. ‘Chōjūrō’, while many small black spots were formed at first and grown into a large spot overlapping each other in a susceptible cv. ‘Nijisseiki’ (Fig. 3).

In case of the crude toxin (4-0.04 ppm) inoculation, black spots were clearly formed on the surface of susceptible fruit skin, and necrotic lesions at the cut end of the small pieces of leaves, although reaction on fruit skins was weaker as compared with the inoculations of spores. However, no symptoms were observed to the toxin in the mutant like a resistant cv. ‘Chōjūrō’.

Thus, the present mutant obviously differs from the original cv. in the susceptibility to the disease. However, it is slightly weaker in the resistant degree as compared with cv. ‘Chōjūrō’. It seems that moderate resistance of the mutant may be due to the periclinal chimera because high frequency of occurrence of periclinal chimera is known in case of bud sport.

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