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Observation on Morphology of Basidia in Korean commercial *Agaricus bisporus*

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한국에서 시판되는 *Agaricus bisporus* 의 담자기 형태

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ABSTRACTS: Observations of basidia in Korean Commercial *Agaricus bisporus* were made with Electron Scanning Microscope. One and two spored basidia were found, but this is not consistent with the other observation. Based on this observation, some sepeculation was made for breeding systems for Korean Commercial *A. bisporus*.

KEYWORDS: *Agaricus bisporus*, Basidium.

Much information about the basic biology of *Agaricus bisporus* (Lange) Imbach has been vorgue despite many investigations over several decades. Much is known about the conditions for profile fruiting on a massive, commercial scale (Chang, 1984), but nothing is known about basic biology of *A. bisporus*. Therefore, the development of a breeding method for *A. bisporus* has been needed for solving the problems present in mushroom industries. The selection of the strains resistant to viral disease (Van Zaayen, 1978), mesophilic fungi and spoiling insects (Moessner, 1965; Kneebone, 1971; Fristche, 1977) is suggested to be needed in this present time.

The mycelial character of *A. bisporus* is quite different from that of the majority of hymenomycetes as typified by *Pleurotus ostreatus, Coprinus* sp., and *Lentinus edodes*. Cells aremultinucleate, septal clamp connections have never been observed, and no evidence for nuclear migration, nuclear pairing or conjugate nuclear division (Miller, 1971; Raper, 1972). Morphologically, two sterigmata (two basidiospores attached basidium) is only observed in Korean commercial *A. bisporus*. That gives very complicated understandings in sexuality and breeding systems for Korean commercial *A. bisporus*. Two questions for sexuality systems are arised in Korean commercial *A. bisporus*; "Does the meiosis occur in basidium?", and "Is the basidiospore produced in basidium heterothallic or homothallic?". The answers for these are considered to give a big events or, at least, prespectives for a breeding system in Korean commercial *A. bisporus*.

Several times, we tried to observe the meiosis of nuclear in Korean commercial *A. bisporus* with studious methods, such as Haematoxylen (Henderson, 1968; Dring, 1971; Uhm, 1986), Giemsa (Duran, 1980) and others (Evans, 1959). The course of meioses in basidium were not observed with the above methods, but the four nuclei in basidium were found with Giemsa staining. The continuous works for confirming the meiosis were not feasible under our labratory conditions. It was speculated that four nuclei observed should be resulted from the meioses in basiduim. This was also consistent with Evans'work (1959).

Evans (1959) reported that one, two three and four sterigmata basidia were present in *Agaricus bisporus* with the frequencies of 4.0, 91.6, 3.8 and

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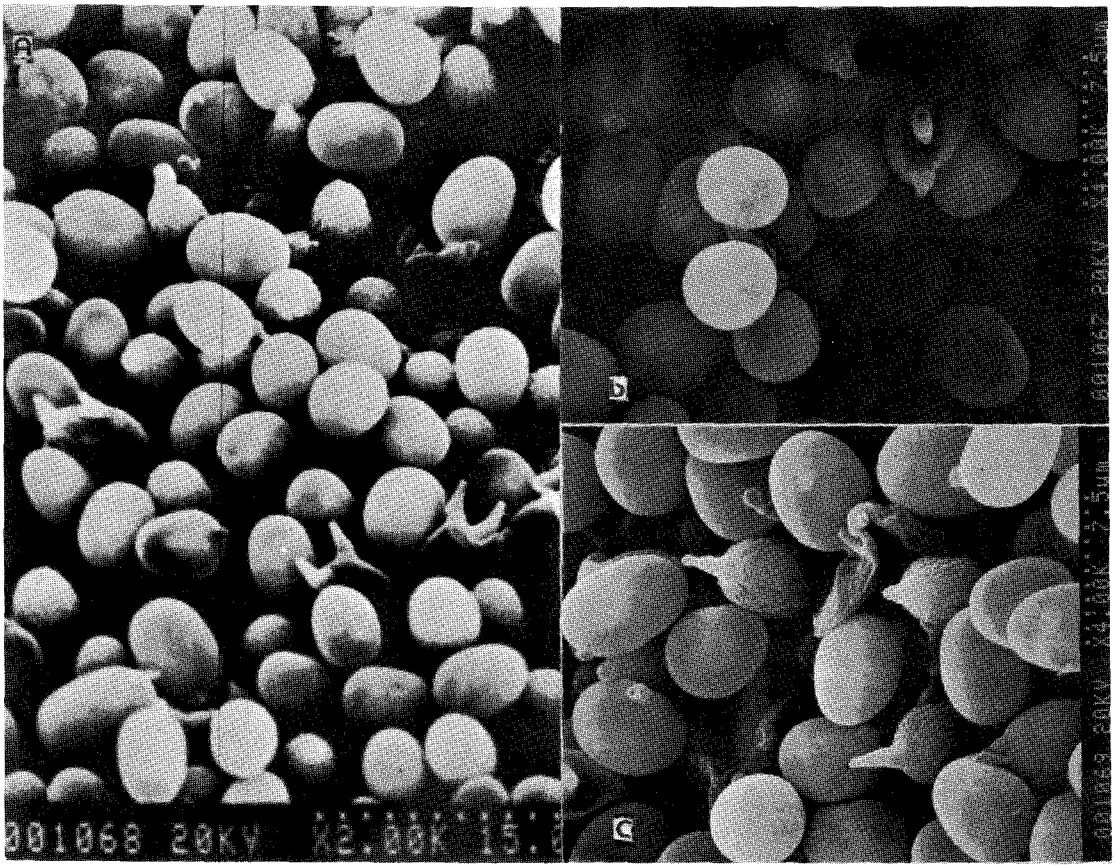

Fig.1. The observations of *Agaricus bisporus* basidia by the scanning electron microscope.

0.6%, respectively. Miller (1971) indicated that 2-, 3- and 4-spored basidia were found in the wild type-*Agaricus bisporus,* but only 3-spored basidia were found in the commercial one with very low frequency of 2.4%. These observations in *A. bisporus* were supported, however, without any data for basidium frequencies, by Elliot (1977), So, Raper (1972) concluded, with these data, that *A. bisporus* should be homothallic in two spored basidium, but heterothallic in four spored basidium. Therefore, the 3- and 4-spored basidia were not observed in Korean commercial *A. bisporus* with high resoluted microscope (SEM, see Fig.1). One spored and two spored (represented as one and two sterigmata-basidia) were observed in Fig.1a.

The detail obaservation of two spored basidia were found in Fig.1b. Several one spored basidia were found in Fig.1c. Thus, the morphology of one spored basidia were different from that of two spored basidia. The one spored basidia (one basidiospore attached basidia) were never found, but only one sterigmata basdium in our specimens of Korean commercial *A. bisporus.* It was considered that one spored basidia may be degenerated before the basidiospore production. Our observations of Korean commercial *A. bisporus* with SEM were quite different from others works (Evans, 1959; Miller, 1971; Elliot, 1978). If this observation for Korean commercial *A. bisporus* be correct, the development of breeding system by anatomisis was not feasible in Korean mushroom industry.

摘 要

한국산 양송이 버섯의 담자기들을 전자현미경으로 관찰하였으며, 그 결과는 one and two spored basidia만 관찰이 되어 다른 연구자의 관찰과는 상이하였다. 이를 기초로 하여 한국산 양송이 육종에 대한 방법론을 제시하였다.

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