

QUALITY EVALUATION OF HOAI SON TUBERS (*DIOSCOREA PERSIMILIS* HOOK.F.) CULTIVATED IN NHO QUAN, NINH BINH

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ABSTRACT

Background: Dioscorea tubers have been planned in Van Phuong, Nho Quan (Ninh Binh) since 2020. Evaluating the quality of domestically produced medicinal herbs, preserving the genes of indigenous medicinal plants, and thereby proactively sourcing internal medicinal herbs is an urgent requirement. Objectives: Evaluate the quality of tubers collected from Dioscorea persimilis Hook.f. trees, Dioscoreaceae family, which grown in Nho Quan district, Ninh Binh province in 2023 according to the criteria specified: described in morphology, microsurgical characteristics, and powder examination; Determine moisture. Material and Methods: Tubers harvested from 1-year-old Hoai Son trees were described in morphology, microsurgical characteristics, and powder examination; Determine moisture. Results: The quality of Hoai Son tubers meets the regulations of PV EV on the following indicators: Description of medicinal herbs, microsurgical characteristics, powder screening; humidity: 12.03%. Conclusion: Hoai Son medicinal herbs grown in Nho Quan, Ninh Binh meet the criteria specified in PV EV.

Keywords: *Dioscorea tubers, quality medicinal herbs, Ninh Binh.*

1. Introduction

Chinese yam (*Dioscorea tubers*) has long been used in Vietnam as both medicine and food, and it is included in the national pharmacopeia (Ministry of Health, 2017). The medicinal material derived from Chinese yam has hypoglycemic, anti-infective, digestive-stimulating effects and is used for treating skin abscesses (Nguyen Viet Than, 2020). Currently, most Chinese yam used in Vietnam is still imported; only a small amount is collected from the wild or cultivated in certain localities. Among these, Chinese yam has been experimentally cultivated in Van Phuong, Nho Quan (Ninh Binh) since 2020 and has been supplied

to customers as food, but its quality for medicinal use has not yet been evaluated. Research results on Chinese yam serve as the basis for confirming its quality and further expanding its cultivation and harvesting for medicinal purposes.

2. Materials and Methods

2.1. Experimental materials

Chinese yam roots cultivated for 12 months were harvested, washed, and dried at 60°C until completely dry.

Solvents and chemicals meeting analytical grade standards.

Laboratory equipment meeting experimental standards.

2.2. Experimental methods

Each experiment was arranged in a completely randomized design with 5 replications. Data were processed using Microsoft Excel.

All experiments were conducted according to the pharmacopeial monograph (Ministry of Health, 2017).

2.3. Observed indicators and analytical methods

Macroscopic characteristics: The swollen tuberous root appears in various shapes, typically cylindrical, straight or curved, from 5 cm in length upward, and may reach up to 1 m; diameter ranges from 1-3 cm and can reach 10 cm. The exterior is yellow-brown, smooth, firm; the fracture surface contains abundant ivory-white powder with no fibers. When sliced thinly, the outer surface is white or pale yellow, the texture is brittle and easily broken; the

fracture surface is white with abundant starch (Ministry of Health, 2017).

Powder microscopy: Starch grains are ovoid or bell-shaped, 10-60 μm long and about 15-50 μm wide, showing concentric striations with an eccentric hilum appearing as a dot or fissure. Calcium oxalate crystals are needle-shaped, 35-50 μm long. Parenchyma fragments have thin-walled cells containing starch. Reticulate vessels are present (Ministry of Health, 2017).

Qualitative identification: Under ultraviolet light, Chinese yam powder exhibits bright white fluorescence (Ministry of Health, 2017).

Moisture content: The moisture content of Chinese yam must not exceed 14% (Ministry of Health, 2017).

3. Results and Discussion

3.1. Characteristics of *Dioscorea persimilis* (Figure 1)



Figure 1. Fresh Chinese yam (1a) and sliced, dried Chinese yam (right)

The external morphology of Chinese yam exhibits characteristics consistent with the description in the pharmacopeia (Ministry of Health, 2017). Notably, the tubers display branching and a heavier mass, which helps distinguish them from

Dioscorea cirrhosa (“Coc”), a non-branching species that is often mistaken for Chinese yam (Nguyen Viet Than, 2020).

3.2. Microscopic characteristics of Chinese yam powder (Figure 2)

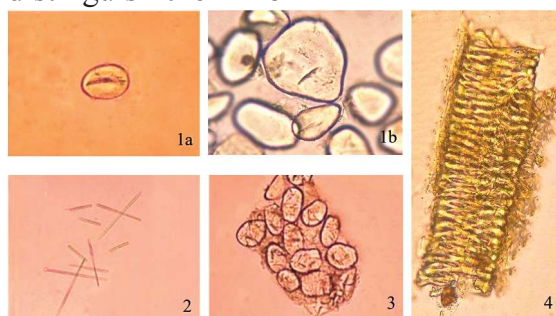


Figure 2. Microscopic features of Chinese yam powder

Legend: 1a: Ovoid or bell-shaped starch granules (1b); 2: Needle-shaped calcium oxalate crystals; 3: Parenchyma fragments with thin-walled cells containing starch; 4: Reticulate vessels.

The components observed in the sample match the requirements of the pharmacopeia (Ministry of Health, 2017), the herbal medicine teaching materials (Hanoi University of Pharmacy, 2001), and previous publications (Nguyen Thi Thu Huyen et al., 2019). The sample examined consists of starch from Chinese yam.

3.3. Qualitative identification

+ Under ultraviolet light, the powdered material emits bright white fluorescence (Figure 3):

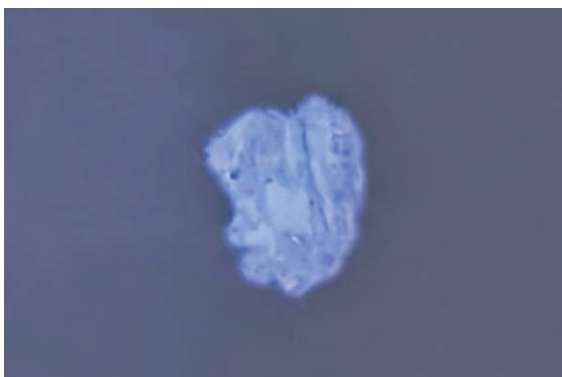


Figure 3. Chinese yam powder under UV light at $\lambda = 366 \text{ nm}$

The starch in Chinese yam exhibits fluorescence, and the sample tested shows characteristics consistent with textbook descriptions (Hanoi University of Pharmacy, 2001) and published research (Nguyen Thi Thu Huyen et al., 2019).

+ Thin-layer chromatography (TLC) (Figure 4).

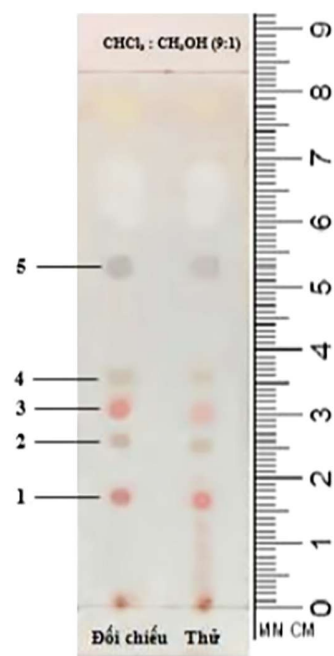


Figure 4. TLC results of Danapha Chinese yam powder (reference sample) and test sample (research sample)

TLC spot	Color	Rf
1	Pink	0.16
2	Dark gray	0.31
3	Light pink	0.37
4	Ash gray	0.43
5	Gray	0.64

On the chromatograms, both the reference sample and the test sample displayed 5 spots with colors and Rf values comparable to the standard herbal material (Danapha

Pharmaceutical JSC, 2021), consistent with the pharmacopeial requirements (Ministry of Health, 2017) and teaching materials (Hanoi University of Pharmacy, 2001).

3.4. Moisture content

Table 2. Moisture content of Chinese yam

Sample	Sample weight (g)	Moisture (%)	Pharmacopoeia limit (Vietnamese Pharmacopoeia V)	Conclusion
1	1.0012	12.05	≤ 14%	Pass
2	1.0006	12.09		
3	1.0007	11.94		
X ± SD		12,03 ± 0,06		
RSD (%)		0,03		

The average moisture content of the Chinese yam samples was $12.03 \pm 0.06\%$, below the permissible limit (not more than 14%) (Ministry of Health, 2017), and not significantly different from the comparison sample (12.04%) (Danapha Pharmaceutical JSC, 2021). The moisture content of the Chinese yam meets current medicinal material requirements (Ministry of Health, 2025).

4. Conclusion

The Hoai Son tuber grown and harvested in Nho Quan, Ninh Binh meets the criteria for medicinal plant characteristics, herbal powder analysis, qualitative determination, and moisture content as per the regulations of DĐVN V.

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