

The mechanism of *Arisaema peninsulae* transsexual change

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1 Abstract

The beech wildwood which represents the world is seen at Mt. Shirakami where is one of the world natural heritage in Japan. In much biodiversity, a plant called *Arisaema peninsulae* is growing at forest floor. Ordinary plants have both a stamen and a pistil in a single plant. But *Arisaema peninsulae* has either a stamen or a pistil in one flower. Regardless of chromo some, when the plant has grown, it will be male or female. We found the plant's size had strong relation to determination of reproductive organs.



Fig.1



Fig.2



Fig.3

- 1 The outward appearance
- 2 An anthesis.
- 3 The left, female individual (pistil)
The right, male individual (stamen)

Arisaema Peninsulae

The perennial herb by which it generally lives in a Japanese forest floor widely. It's found to change sex expression of an anthesis by a year with the propagation style called a false different stock of male and female.

2 Method

Outdoor investigation: The height of an *Arisaema peninsulae* and the distribution point of view of the diameter of a stem and the individual of male and female are recorded.

Indoor investigation: We plant an *Arisaema peninsulae* in 3 flower planters in a chemical room, put it by the window and observe

3 Result and Conclusion

(1) About the thickness of the stem (the ground 1cm)

and sexual correlation.

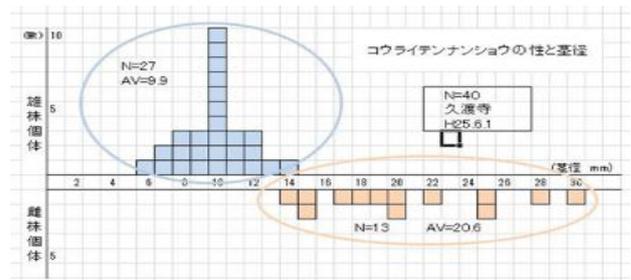


Fig.4 The thickness of the stem of the male and female (H25).

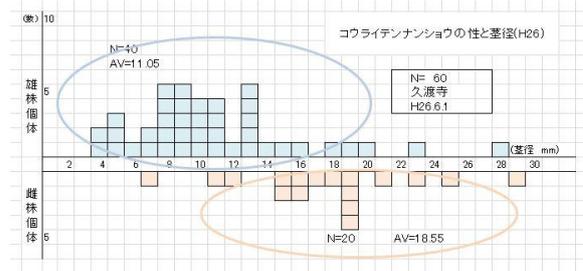


Fig.5 The thickness of the stem of the male and female (H26).

⇒A female is thick and male is thin. As a stem diameter we measured, the diameter 14mm is a boundary line of the male and female.

(2) Change H25, 26 and 27 of the number of individuals of male and female

Several individuals were also growing naturally at Shirakami, but there was made the investigation ward because there was a colony in Kudoji.

The ratio of the male and female (the appearance rate of the female)

H25) a female: Male =13:27

The female appearance rate 32.5%

H26) a female: Male =22:38

The female appearance rate 36.7%

H27) a female: Male =23:59

The female appearance rate 28.0%

⇒For 3 years averaged, the appearance rate of the female is 31.9%. Only the half by which a female is a male, distributed. There may be a special condition to become a female.

(3) The growing condition of the female

There were a lot of females under the slope overall, and there were a lot of males on the slope, so the next hypothesis was set up.

A hypothesis: The way where a female plant has been just here, I'd like the nutritional position.

Investigation method: Ground is extracted from 3 points of female plant and us who have just had a male plant and the electric conductivity and pH are checked.

結果
雌雄に土壤の栄養状態もpHも関係は無い

番号	EC		pH	場所
	2mS/cm	20mS/cm		
354	0.64	0.14	4.84	低地の♂
360	0.54	0.13	5.35	高地の♂
364	0.58	0.12	5.40	♀

Fig.6 EC and pH in each ground

About the growing condition of the female.

⇒It was impartial in the nutritional state of the ground.

* The tuber which becomes proportional to the age of the individual and big is the next year.

The photosynthetic amount decides about the individual size which is so or may influence big.

(4) The height of the individual of male and female and the growing naturally place illumination

We thought whether not ground condition, but the difference in the amounts of growth by the difference in the photosynthetic amount is a factor of differentiation of a male and female and measured the illumination of each individual habitat.

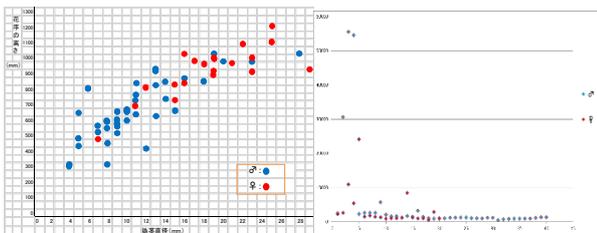


Fig.7(left) The height of the anthotaxy and diameter of a stem

Fig.8(right) The illumination and the individual distribution of a male and female.

About the height of the individual of male and female and the growing naturally place illumination.

⇒Something proportional to the thickness of the stem and also tall over 900mm is a female. The illumination of each individual habitat was measured again, but there were no clear differences by the male and female.

(5) The distribution point of the male and female.

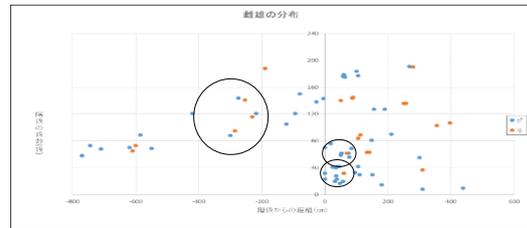


Fig.9 The distribution map which made the stairs in Kudoji a center axis.

The feature of the distribution place of male and female

⇒The tendency over which a male individual is distributed concentrically around the female individual is seen.

(6) Reproduction and sex-differentiation from a clone tuber



Fig.10 Clone tuber and pro-individual



Fig.11 Differentiation of a male and female of a clone
⇒A female pro-tuber grows to female or back to male..All clone tuber grows to male.

Cultivation at a laboratory showed that *Arisaema peninsulae* makes a clone tuber. This thing is parallel with the feature of the distribution map of Fig.9 All individuals showed that it'll be an anthotaxy from the 3rd leaf sprout.

4 Reflection and problem

It was possible to grasp the feature of the male and female through an investigation at outdoor and cultivation at an interior, but a physiology-like factor of differentiation of a male and female isn't certain, so I'd like to make the point future's investigation clearly by an experiment.

5 Reference

Hiroki Yamagishi 2013. (Hirosaki University)
Basic research about propagation of *Arisaema peninsulae* in Shirakami (9th number of Shirakami study P27~32)