REPRODUCTION STRATEGIES IN BRASSICA NIGER VAR. PT-303

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Abstract: The first flower was opened on an average 29th day and the single continuous flowering period was 26-30 days . The average number of pollen grains per anther 369.8 and per chamber 92.44 have recorded . The variation in the number of pollen grains among flowers in this variety may be caused by the variation in male phase duration. The results suggest that variation in male and female function among flowers within inflorescences may affect the fitness of a plant through differential male and female reproductive success in this species . The ovules number per ovary and per plant were 18.2 and 930.8 respectively . The total number of pollen grains on stigma were 37.3 while the germinated pollen number on stigma was 9.7. The average number of fertilized ovules were 10.8 and the maximum number of seeds per fruit were 10.3. The stigmas were receptive upto 4 days after anthesis . Intravarietal crosses were 75% successful and seed setting was 65 % . The high positive correlation has been found between germinated pollen grains and fertilized ovules per ovary(+0.8189) .

Keywords: Brassica niger, Pollen grains, Sex allocation, Correlation

REFERENCES

- Ashman, T.L. and Hitchens, M.S. (2000). Dissecting the causes of variation in intra-inflorescence allocation in a sexually polymorphic species, *Fragaria virginiana* (Rosaceae). *American Journal of Botany*, **87**:197-204.
- Bell ,G. (1985). On the function of flowers. Proceedings of the Royal Society of London, B, *Biological Sciences* ,224 : 223-265.
- Bell, S. A. and Cresswell, J.E. (1998). The phenology of gender in homogamous flowers: temporal change in the residual sex function of flowers of oil-seed rape (*Brassica napus*). Functional Ecology, 12: 298-306.
- Berg, R. L. (1959). A general evolutionary principle underlying the origin of developmental homeostasis. *American Naturalist*, 93: 103–105.
- **Berg**, **R.** L.(1960) .The ecological significance of correlation pleiades. *Evolution* .14 :171–180.
- Brunet , J. (1996). Male reproductive success and variation in fruit and seed set in

Aquilegia caerulea (Ranunculaceae). *Ecology*,**77**: 2458-2471.

- Brunet, J. and Charlesworth, D. (1995). Floral sex allocation in sequentially blooming plants. *Evolution*, **49:** 70-79.
- Cheverud, J. M.(1984). Quantitative genetics and developmental constraints on evolution by selection. *Journal of Theoretical Biology*, **110**: 155–172.
- **Diggle, P. K.** (1995). Architectural effects and the interpretation of patterns of fruit and seed development. *Annual Review of Ecology and Systematics*, **26**: 531-552.
- Fink, W. L. and Zelditch,M.L. (1996). Historical patterns of developmental integration in Piranhas. *American Zoologist*, **36**: 61-69.
- Garcia, M. B. (2003). Sex allocation in a longlived monocarpic plant. *Plant Biology*, 5: 203-209.
- Guitián, J.; Guitián, P.; Medrano, M. (2001). Causes of fruit set variation in *Polygonatum odoratum* (Liliaceae). *Plant Biology*, **3**: 637-641.
- Huang, S. Q.; Tang, L. L.; Q, Yu.; Guo, Y.H .(2004). Temporal floral sex allocation

in protogynous *Aquilegia yabeana* contrasts with protandrous species: support for the mating environment hypothesis. *Evolution*, **58**: 1131-1134.

- Ishii, H. S. and Sakai, S. (2002). Temporal variation in floral display size and individual floral sex allocation in racemes of *Narthecium asiaticum* (Liliaceae). *American Journal of Botany*, 89: 441-446.
- Kliber, A. and Eckert, C.G. (2004). Sequential decline in allocation among flowers within inflorescences: proximate mechanisms and adaptive significance. *Ecology*, 85: 1675-1687.
- Klingenberg, C. P. and Zaklan, S.D. (2000). Morphological integration between developmental compartments in the *Drosophila* wing. *Evolution*, **54:** 1273-1285.
- Kudo, G.; Maeda, T. and Narita, K .(2001). Variation in floral sex allocation and reproductive success within inflorescences of *Corydalis ambigua* (Fumariaceae): pollination efficiency or resource limitation?. *Journal of Ecology*, 89 :48-56.
- Mahavarao, V. N.; Abdul Khader, J.B.M. (1962). Estimation of pollen production in fruit crops. *Madras. Agricultural Research Journal*, **49:** 152-156.
- **Oberle, G. D.; Goertzen, K. L**. (1952). A method for evaluating pollen production of fruit varieties . Proceeding American Society of Horticultural Science. **59 :** 263-265 .
- Primack, R. B. (1985). Longevity of individual flowers. Annual Review of Ecology and Systematics. 16: 15-37.
- Richardson, T. E.; Stephenson, A.G. (1989). Pollen removal and pollen deposition affect the duration of the staminate and pistillate phases in *Campanula rapunculoides*. *American Journal of Botany*, **76**: 532-538.

- Sargent, R. D ,; Roitberg,B.D .(2000). Seasonal decline in male-phase duration in a protandrous plant: a response to increased mating opportunities?. *Functional Ecology*, **14**: 484-489.
- Schlichting, C. D. (1989b). Phenotypic plasticity in Phlox. II. Plasticity of character correlations. *Oecologia* ,78: 496-501.
- Schlichting, C. D. and Pigliucci, M. (1998). Pheno- typic evolution: a reaction norm perspective, 1st ed. Sinauer Associates, Sunderland, Massachusetts, USA
- Shubin, N. H. and Wake, D. (1996). Phylogeny, variation, and morphological integration. *American Zoologist* ,36: 51-60.
- Stearns, S. G.; de-Jong ,; Newman, B .(1991) .The effects of phenotypic plasticity on genetic correlations. *Trends in Ecology and Evolution*, 6: 122-126.
- Steppan, S. J. (1997) .Phylogenetic analysis of phenotypic covariance structure. I. Contrasting results from matrix correlation and common principal component analyses. *Evolution*, 51: 571-586.
- Stebbins, G. L .(1974). Flowering plants. evolution above the species level. Harvard University Press, Cambridge, MA.
- Wagner, G. P. (1995). Adaptation and the modular design of organisms. In F. Moran, A. Moreno, J. J. Merelo, and P. Chacon [eds.], Advances in Artificial life, 317–328. Springer, Berlin, Germany.
- Wagner, G. P.; Schwenk , K .(2000). Evolutionarily stable configurations: functional integration and the evolution of phenotypic stability. *Evolutionary Biology*, **31:** 155-217.
- Wolfe, L. M. (1992). Why does the size of reproductive structures decline through

time in *Hydrophyllum appendiculatum* (Hydrophyllaceae)? Developmental constraints vs. resource limitation. *American Journal of Botany*,**79:** 1286-1290.

- Wolfe, L. M. and Denton, W. (2001). Morphological constraints on fruit size in *Linaria canadensis*. *International Journal of Plant Sciences*, **162:** 1313-1316.
- Wyatt, R. (1982). Inflorescence architecture: how flower number, arrangement, and phenology affect pollination and fruitset. *American Journal of Botany*, **69**: 585-594.
- Zelditch, M. L.; Bookstein, F.L.; Lundrigan,B.L .(1992). Ontogeny of integrated skull growth in the cotton rat *Sigmodon fulviventer. Evolution*, 46: 1164-1180.