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Cytogenetical Analisis of Rosa Chinensis

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Abstract

Fertility of hybrid tea roses is often reduced due to their interspecific origin but also to intensive inbreeding. New genotypes used as pollen donors represent an economic risk for a breeding programme, as their influence on seed production is unknown. In this study 11 cut rose genotypes were selected from a company database as high fertile or low fertile male parents, according to the number of seeds per hybridisation. Pollen morphology and in vitro germination of the selected genotypes were characterised. Pollen was either small (mean diameter <30 mu m), shrunken, and irregular (abnormal), or large (mean diameter > 30 mu m), elliptical and crossed by furrows (normal). High correlations were found between the number of seeds produced per hybridisation and the pollen diameter (r = 0.94) or the percentage of normal pollen (r = 0.96). In order to evaluate the predictive power of the models, we conducted regression analyses and performed a validation experiment on genotypes not present in the database and without background information on fertility. Pollen diameter and percentage of normal pollen were characterised and fitted in the regression models for seed set predictions. Validation with an independent dataset gave a good prediction for 83.3% of the data. This indicates that using either the mean pollen diameter or the percentage of normal pollen resulted in effective fertility prediction. This tool could enhance the genetic variability in crossings between hybrid tea roses, thus creating possibilities for less economically risky exploitation of new tetraploid genotypes as male parents.

Intoduction

Ctyogenetics

Cytogenetics is a branch of genetics that is concerned with the study of the structure and function of the cell, especially the chromosomes. It includes routine analysis of G-bandedchromosomes, other cytogenetic banding techniques, as well as molecular cytogenetics such as fluorescent *in situ* hybridization (FISH) and comparative genomic hybridization (CGH).

A rose is a woody perennial of the genus *Rosa*, within the family Rosaceae. There are over 100 species. They form a group of plants that can be erect shrubs, climbing or trailing with stems that are often armed with sharp prickles. Flowers vary in size and shape and are usually large and showy, in colours ranging from white through yellows and reds. Most species are native to Asia, with smaller numbers native to Europe, North America, and northwest Africa. Species, cultivars and hybrids are all widely grown for their beauty and often are fragrant. Rose plants range in size from compact, miniature roses, to climbers that can reach 7 meters in height. Different species hybridize easily, and this has been used in the development of the wide range of garden roses.

The name *rose* comes from French, itself from Latin *rosa*, which was perhaps borrowed fromOscan, from Greek ρόδον *rhódon* (Aeolic βρόδον *wródon*), itself borrowed from Old Persian*wrd-* (*wurdi*), related to Avestan *varəδa*, Sogdian *ward*, Parthian *wâr*.

Pollen fertility in garden rose

TRIPLOIDY HAS PLAYED an important part in the history of garden roses. Of the principal ancestral species, five are diploid with 14 chromosomes (Rosa moschata, chinensis, gigantea, multiflora and wichuraiana) and two are tetraploid with 28 (R. gallica and foetida). It is obvious that triploids must arise from their coming together in gardens and glasshouses and sharing pollen indiscriminately.

Triploids, while often desirable plants in themselves, have the reputation for being difficult breeding material. Fruiting may take place rarely (or only parthenogenetically), and in extreme cases they may produce no viable pollen at all. It is therefore of some interest to examine triploidy in garden roses, its effect on fertility and in breeding programs.

Materials

Five spicies examined in the present study are listed in the given below table.

Species	**Chromosome number(2n)**	**Number of plants observed**	**Locality**
Miss Lowe	**14, diploid**	5	Burdwan,West Bengal,India
Marie van Houtte	**14, diploid**	5	Naihati,West Bengal,India
Champney's Pink Cluster	**14, diploid**	4	TC Palya,Bangalore,India
Old Blush China	**14, diploid**	8	Behela,West Bengal,India
Violet Bengal Rose	**14, diploid**	12	Bankura,West Bengal,India

1.Acetic alcohol
2.70% ethanol
3.1% propionic acid
4.0.5% 2,3,5 triphenytetrazollum chloride

Procedure

Flower buds in the ideal stagefor meiotic analysis were collected,fixed in acetic alcohol(1:3) for 24 hours,transferred to 70% ethanol andstored at 4’c.Slide preperations were made by the squash technique and stained with 1% propionic caramine.

Pollen grains were fixed in acetic acid (1:3) for 24 hours at room temperature and stored in 70 % alcohol at -18’c.Pollen fertility was estimated by examining the percentage of stored pollen grains with 0.5% 2,3,5-triphenytetrazollum chloride(TTC).

Result analysis

Serial number	Name of the species	Chromosome number	Number of pollens taken	Number of stained pollens	Fertile pollens	Pollen fertility (%)
1	**Miss Lowe’s rose**	14 diploid	120	119	111	92.50
2	**Martin Van Houtte**	14 diploid	120	117	101	84.16
3	**Champney’s Pink cluster**	14 dploid	120	105	98	81.66
4	**Rosa old Blush Chaina**	14 diploid	120	120	115	95.81
5	**Rose Bengal violet**	14 diploid	120	111	99	82.19

Discussion

All the five species of Rosa chinensis falling into different sub species like tea rose, gaeden rose , chaina rose etc are been analysed via pollen fertility test to take an overview of their fertile pollens and the capability of their fertility.

Pollens been dipped into sucrose, and then stained with acetocarmine stain.

The five species which are analysed gave a positive result of their fertility and fertile pollens which has been tabulater in the result analysis.

Miss Lowes’s rose possessing the chromosome number of 14 diploid , and having fertile pollens of 111 gave a fertile test of 92.50%

Martin Van houtte possessing the chromosome number of 14 diploid , and having fertile pollens of 101 gave a fertile test of 84.16%

Champney's Pink Cluster possessing the chromosome number of 14 diploid, and having fertile pollens of 98 gave a fertile test of 81.66%

Rosa old blush Chaina possessing the chromosome number of 14 diplod , and having fertile pollens of 115 gave a fertile test of 95.81%

Rose Bengal Violet possessing the chromosome number of 14 diploid ,and having fertile pollens of 99 gave a fertile test of 82.19%

Hence all the sub species of roses which has been studied are fertile enough and has a good pollen percentile for its reproductiuon and generation growth.

References

1. ^ Stedman's Medical Dictionary (28th Ed.). (2006). Baltimore, MD: Lippincott Williams.
2. ^ Levitsky G.A. 1924. *The material basis of heredity*. State Publication Office of the Ukraine, Kiev. [in Russian]
3. ^ Levitsky GA (1931). "The morphology of chromosomes". *Bull. Applied Bot. Genet. Plant Breed* **27**: 19–174.
4. ^ Kottler M. 1974. From 48 to 46: cytological technique, preconception and the counting of the human chromosomes. *Bull. Hist. Med*. **48**, 465-502.
5. ^ von Winiwarter H. 1912. Études sur la spermatogenese humaine. *Arch. biologie* **27**, 93, 147-9.
6. ^ Painter T.S. 1922. The spermatogenesis of man. *Anat. Res.* **23**, 129.
7. ^ Painter T.S. 1923. Studies in mammalian spermatogenesis II. The spermatogenesis of man. *J. Exp. Zoology* **37**, 291-336.
8. ^ Wright, Pearce (11 December 2001). "Joe Hin Tjio The man who cracked the chromosome count". The Guardian.
9. ^ Saxon, Wolfgang (7 December 2001). "Joe Hin Tjio, 82; Research Biologist Counted Chromosomes". The New York Times.
10. ^ Tjio J.H & Levan A. 1956. The chromosome number of man. *Hereditas* **42**, 1-6.
11. ^ Hsu T.C. *Human and mammalian cytogenetics: a historical perspective*. Springer-Verlag, N.Y.
12. ^http://www.britannica.com/EBchecked/topic/228983/human-genetics/50731/The-human-chromosomesEncyclopædia Britannica, The Human Chromosome
13. ^http://www.evolutionpages.com/chromosome_2.htmEvolution Pages, Chromosome fusion
14. ^ Painter T.S. 1933. A new method for the study of chromosome rearrangements and the plotting of chromosome maps. *Science* **78**: 585-586.
15. ^ Dobzhansky T. 1951. *Genetics and the origin of species*. 3rd ed,

Columbia University Press, New York.

16. ^ Dobzhansky T. 1970. *Genetics of the evolutionary process*. Columbia University Press N.Y.
17. ^ [Dobzhansky T.] 1981. *Dobzhansky's genetics of natural populations*. eds Lewontin RC, Moore JA, Provine WB and Wallace B. Columbia University Press N.Y.
18. ^ Lejeune J, Gautier M, Turpin MR. *Etude des chromosomes somatiques de neuf enfants mongoliens.* C R Acad Sci (Paris) 1959;248:1721-2.
19. ^ Nowell PC, Hungerford DA. *A minute chromosome in human chronic granulocytic leukemia*. Science 1960;132:1497-1501.