Chromosome Numbers of Rubus*

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In the new edition of the Chromosome Atlas (3) there are listed 71 species of *Rubus* with their respective chromosome numbers. An additional 258 species are noted by author reference. This is a helpful record for the cytologist and for the *Rubus* breeder. However, there are no varieties listed and there are many difficulties in the application of this information.

The first difficulty concerns the use of incorrect names of species or clones in any chromosome list. This trouble is not peculiar to *Rubus,* but is perhaps more acute with this genus where species and clones may be difficult to identify. For example, the authors had three plants in the greenhouse which were thought to be the Lucretia dewberry. These three plants all were $2n=53$. In the literature, Lucretia is $2n=42$. It was unlikely that any blackberry expert would be willing to say whether or not these plants were Lucretia. Accordingly, some plants of Lucretia were obtained from the breeding stock of Dr. C. F. Williams, and from a reliable commercial source. All these plants were $2n=49$. Plants of a variety similar in appearance, the Carolina dewberry (N. C. 38–7–3) obtained from the North Carolina State Experiment Station were $2n=53$. Therefore, it is possible that the three plants in the greenhouse were not Lucretia, but were the variety Carolina. Another example of incorrect identification is illustrated in Table 1 by the two collections of La France. The triploid collection is in all probability only a seedling of La France, if it is actually related to La France.

The second difficulty concerns inaccurate chromosome number determinations. Some of the older determinations apparently suffered from inadequate cytological methods. *Rubus* chromosomes are small and the use of certain fixatives causes them to stick together at their ends. This is especially true with Navaschin-type fixatives. Examples of faulty determinations are those for Young and for Boysen. These blackberries are both $2n=49$ (1). Chromosome numbers over 42 require painstaking care to determine them with certainty. However, this is important because aneuploids are of more frequent occurrence at higher levels of ploidy (4).

Chromosome numbers estimated from breeding behavior are often inaccurate, and may lead to false assumptions. For example, Young is reported to be a cross between Austin Mayes and Phenomenal. Young ($2n=49$) originally was reported to be $2n=42$ and Phenomenal $2n=42$. Accordingly, it was assumed by many workers that Austin Mayes was also $2n=42$. Such may not be the case since the closely related Austin Thornless is $2n=56$. Chromosome numbers should be carefully determined, rather than estimated from breeding data.

Another difficulty concerning chromosome numbers of *Rubus,* has been described only recently (1, 2). It has shown that some plants of *Rubus* are

*Scientific Article No. A 600; Contribution No. 2776 of the Maryland Agricultural Experiment Station, Department of Horticulture.

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TABLE 1. Chromosome numbers of species and varieties of *Rubus*.

Species or variety	*Source*	*Chromosome number*
	P.I. 194478 (S. Africa)	
	P.I. 164571 (India)	
R. coreanus	P.I. 223599	
R. flosculosus	P.I. 223594	
R. giraldianus	P.I. 223595, P.I. 223584	
R. gracilis	P.I. 223583	
R. innominatus	USDA, Beltsville, Maryland	
R. inopertus	P.I. 223596	
R. lasiostylus	P.I. 223608	
R. ludwigii	USDA, Beltsville, Maryland	
R. niveus	P.I. 226599	
R. parvifolius	N. C. Exp. Station	
R. pedunculosus	P.I. 223597	
R. phoenicolasius	Blandy Exp. Farm, Boyce, Va.	
R. thibetanus	P.I. 223598	
R. sp.	P.I. 208561 (Puerto Rico)	
R. sp. (xanthocarpus ?)	P.I. 226232 (Japan)	
R. sp. (pseudo-nipponica ?)	P.I. 227414 (Japan)	
R. sp.	P.I. 210549 (India)	
R. sp.	P.I. 175299 (India)	
R. buergeri	P.I. 116149	
R. sp.	P.I. 210547 (India)	
Raspberry		
Heytor	P.I. 223643	$2n=14$
Malling Exploit	P.I. 223837	$2n=14$
Malling Jewel	P.I. 223838	$2n=14$
Souvenir de Désiré Bruneau	P.I. 223646	$2n=14$
All Summer	P.I. 223856	$2n=21$
Belle de Fontenay	P.I. 223857	$2n=21$
La France?	P.I. 223858	$2n=21$
Merveille de Quatre Saisons	P.I. 223859	$2n=21$
November Abundance	P.I. 223860	$2n=21$
Perpetuelle de Billard	P.I. 223645	$2n=21$
Colossus	Porter-Walton Co., Salt Lake City, Utah	$2n=28$
La France	P.I. 223644	$2n=28$
Blackberry		
Burbank Thornless	USDA, Beltsville, Maryland	$2n=14$
McDonald	R. Kays, Okla. A&M, Stillwater, Okla.	$2n=14$
Early Wonder	USDA, Beltsville, Maryland	$2n=28$
Eldorado[1]	Md. Exp. Station	$2n=28$
Jersey Black (N. J. 16)	C. H. Steelman, Fruit Nursery, N. J.	$2n=28$
Nanticoke	Md. Exp. Station	$2n=28$
Cory Thornless	Carlton Nurseries, Forest Grove, Oregon	$2n=42$
Chehalem	G. F. Waldo, Ore. Exp. Station	$2n=42$
Olallie	G. F. Waldo, Ore. Exp. Station	$2n=42$
Boysen[1]		$2n=49$
Thornless Boysen[1]		$2n=49$
Lucretia	C. F. Williams, N. C. Exp. Station	$2n=49$
Young[1]		$2n=49$
Carolina	N. C. Exp. Station	$2n=53$
Austin Thornless	N. C. Exp. Station	$2n=56$
Cascade	Carlton Nurseries, Forest Grove, Oregon	$2n=63$
Pacific	Carlton Nurseries, Forest Grove, Oregon	$2n=63$

[1]See reference 1 of literature cited.

mitotically unstable and consequently have no fixed chromosome number. This characteristic is particularly true of some artificial polyploids and of some plants which resulted from the fertilization of an unreduced egg.

From a breeder's viewpoint, it is worthwhile to have a chromosome number determined for each clone that is used in a breeding program. If it is not feasible for this to be done in every instance, then the continued checking and rechecking of chromosome numbers and their publication by cytologists, will eventually result in the true chromosome numbers of the older clones being known, provided they are mitotically stable.

In addition to the older clones, new ones are available for use. The Plant Introduction Section of the U.S.D.A. has continually supplied materials. Since these have a P.I. number for identification and easy reference, the chromosome numbers (Table 1) may be of interest.

Literature Cited

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Apple Color Variation

J. D. Winter has the following comments to make in a recent newsletter of the Minnesota Fruit Growers Association on color variations of certain apple varieties in different parts of Minnesota: "Some varieties do well over a very wide area, others are at their best only in a comparatively small portion of one state. For example, Lakeland appears to develop a brighter color in the Minneapolis-St. Paul and nearby areas than in Houston County, the same probably is true of Cortland and Minjon. Cortland usually has a brighter finish at Lake City than in Houston County. Oriole is brighter at Duluth than at La Crescent. On the other hand, Jonathan is brighter than Minjon at La Crescent, but not 150 miles farther north."

A Disorder in Stanley Prune

The Stanley Prune is one of the really outstanding plums for the fruit grower and gardener in the north-central and northeastern states. It has been a reliable cropper, large-fruited and good in quality. It is of interest, therefore, that R. H. Hill, Jr., of Ohio State University, reported this past winter in Ohio Farm and Home Research that the Stanley has been affected by a disorder in recent years which is devitalizing many young bearing trees in Ohio. He reports that F. O. Hartman, of Ohio State University, has evidence that this disorder may possibly be associated with a rootstock incompatibility. The rootstocks that may be involved are not mentioned. Dr. Hill does not feel, however, that this rootstock problem is serious enough to eliminate Stanley from future plantings.