The Rapid Cycling Brassica Collection Catalog

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1. Introduction

The Rapid Cycling Brassica Collection, RCBC, was established in 1982 by Paul Williams as a means for distributing seed and information, about various genetic stocks of 6 different species of rapid cycling brassicas. Initially known as the Crucifer Genetics Cooperative (CrGC) the collection now resides under the Wisconsin Fast Plants Program website. The RCBC provides seed stocks of rapid cycling brassicas together with descriptions and ordering information through an RCBC Catalog. More detailed information (photos, pedigrees, etc.) on individual seed stocks is provided through Seed Stock Documents (SSD). General information on growing RCBs and uses of RCB seed stocks for research and education are provided as Information Documents (ID).

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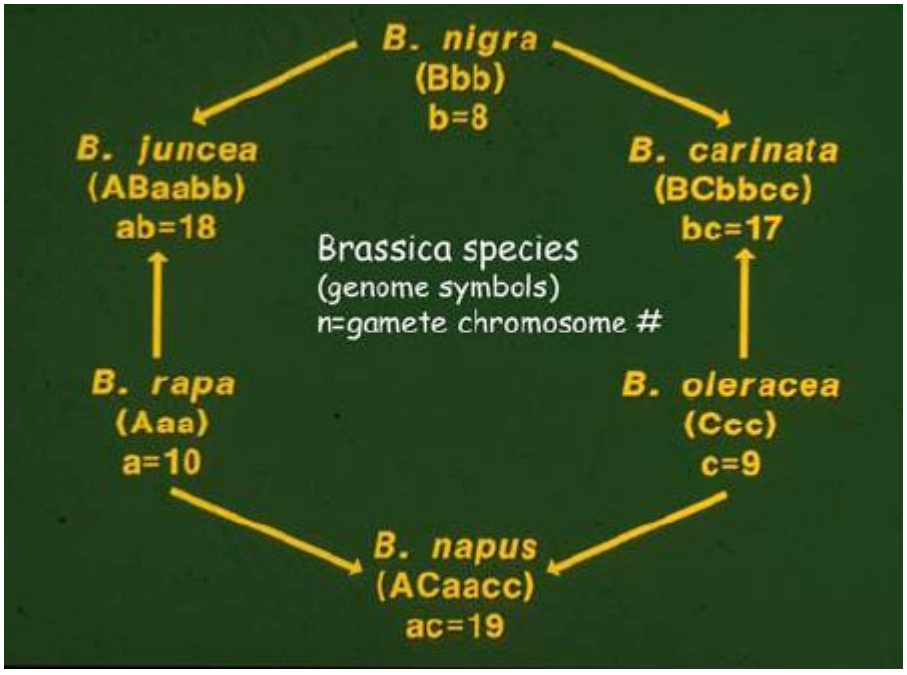
2. Genomes of the rapid cycling *Brassica* species

species	nuclear symbol	haploid number	cytoplasm symbol	diploid genome	days to first flower(20-25°C)
Brassica rapa	a	10	A	Aaa	16
Brassica nigra	b	8	B	Bbb	20
Brassica oleracea	c	9	C	Ccc	30
Brassica juncea	ab	18	AB	ABaabb	19
Brassica napus	ac	19	AC	ACaacc	25
Brassica carinata	bc	17	BC	BCbbcc	26



3. Genetic Terminology

1. Specified traits, **phenotypes**, are designated by three-letter codes representing the description of the trait. The first letter of the code is capitalized. Letters of the code are not italicized or underlined. Similar traits determined to differ in inheritance and having the same descriptive code, are distinguished by an additional number, e.g. Ygr3 and Ygr7 designate yellow green plants conditioned by different genotypes.

2. **Phenotypic traits having varying degrees of expression** may be designated by numbers on a scale of 0-9 in parentheses, to indicate the degree of expression, with 1=very low and 9=very high. e.g. Pan(8) indicates high expression of purple anthocyanin pigment.

The description of the **degree of expression of variable traits** can be given as follows, using for an example the expression of purple anthocyanin and hairiness. For scaling of hue and intensity, comparator charts or visual estimators may be useful.

0 = trait absent	Pan(0) = no anthocyanin	Hir(0) = no hairs
1 = very low expression	Pan(1) = very light purple	Hir(1) = 0-1 hairs
2 = low expression	Pan(2) = light purple	Hir(2) = very few hairs
3 = moderately low expression	Pan(3)	Hir(3) = few hairs
4 = <intermediate expression	Pan(4)	Hir(4)
5 = intermediate expression	Pan(5) = purple	Hir(5) = moderate # hairs
6 = > intermediate expression	Pan(6)	Hir(6)
7 = moderately high expression	Pan(7)	Hir(7)
8 = high expression	Pan(8) = intense purple	Hir(8) = many hairs
9 = very high expression	Pan(9) = very intense purple	Hir(9) = very many hairs
0-5 = trait variable in expression among individuals	Pan(2-5) = Pan variable among individuals	

3. **Quantifiable variation** within a trait may be designated as statistical estimates of mean (x), standard deviation (s), range (r) and population size (n). It may be important to specify environmental parameters when describing quantifiable variation. e.g. Hair number, Hir, on the margin of the first true leaf, Hir (n=48, x=15, s=4, r=27) Environment, standard growing conditions.

4. The ***genotype*** of a specified phenotype is designated in lower case italics (underlined if hand written) using the same three letters, and numbers, of the corresponding phenotype. e.g. ygr3 = *ygr3* = genotype of phenotype Ygr3.

5. **Alleles** are designated by a dash followed by a number, *ygr3-1.* If no allele is specified, it is assumed to be allele 1, i.e. *ygr3-1* is *ygr3*.

6. **Wild type** is designated with specified genotype code, all capitalized in italics. E.g. Wild type of *ygr3* is *YGR3*. **Alternatively** the wild type is designated with a plus (+) symbol associated (following or preceding) the designated code. E.g. wild type of *ygr3* is *ygr3*+, or in a cross with wild type, *ygr3/*+ or +/*ygr3*.

7. **Segregation** of a specified genotype in a progeny is designated by a minus, (-) symbol following the genotypic code. E.g. *ygr3*- or*ygr3/-* , indicates that any individual in the segregating progeny may or may not contain or express the genotype.

8. When crosses are specified, the **gametic contribution** of the maternal parent always precedes the paternal and is separated from the paternal contribution by a slash, (/) e.g. female/male, *YGR3/ygr3* = heterozygote from wild type female x *ygr3* male. Alternatively, *+/ygr3*.

9. Uniparentally (**cytoplasmic**) inherited traits are enclosed in parentheses, e.g. (Var) describes a maternally inherited variegated phenotype.

10. Phenotypic and genotypic **codes for similar traits in different *Brassica* species** may be the same, and are numbered independently for each species, e.g. *ygr3* in *B. rapa* and *ygr3* in *B. oleracea*.

11. In *Brassica, when* **interspecific crosses** are made between stocks with specified traits, e.g. *ygr1* and *ygr2*, **cytoplasmic and nuclear genomic symbols** (not italicized) are given (see section 2 above), followed by the trait descriptive code. The female is specified with the cytoplasmic genomic symbol, in upper case, together with the nuclear genomic symbol, in lower case, followed by the trait descriptive code. The male is specified by the nuclear genomic symbol, in lower case, followed by the trait descriptive code. E.g. Aa *ygr1* x *c ygr2* = Aa *ygr1* / c *ygr2* is a cross between a yellow green *B. rapa* mother (Aa *ygr1*) and a yellow green *B. oleracea* father (c *ygr2*).

4. Phenotypic and *Genotypic* Descriptor Codes

Aat	anthocyaninless anther tip
Abt	anthocyaninless bud tip
Aca1(0-9)	*albugo candida*, race 2, interaction phenotype
Aca2(0-9)	*abugo candida*, race 7, interaction phenotype
Ahd	anthocyaninless hydathodes
Alb	albino plant
anl	anthocyaninless plant
Apt	apetalous
Asp	astroplants (5-10-15)
Bas	brown anther sterile, male sterile
Bpo	base population
Crp	cream petal
Det	determinate flower shoot
dwf1	dwarf, petite
dwf2	dwarf, intermediate
dwf3	dwarf, stocky
ein	elongate internode
Fct	fused cotyledons
Fse	fused sepals
Glb	glabrous plant, hairless
Glo	glossy plant
Hir(0-9)	hirsute plant, hairs
Lyp	light yellow petal
(Mst1)	male sterile, cytoplasmic (R1)
(Mst2)	male sterile, cytoplasmic (AB1)
Mst1	male sterile
mst2	male sterile
Oyp	orange yellow petal
Pan(0-9)	purple anthocyanin
Rci	rapid cycling ideotype, ideal form
ros	rosette plant
Rvp	revolute petal, folded back on itself
(Tzr)	atrazine resistant, cytoplasmic
var	variegated, developmental
(Var)	variegated, cytoplasmic, somatic
Wlr	waterlogging resistant
Wls	waterlogging sensitive
Wpt	white petal
ygr1	yellow-green plant
ygr3	yellow-green plant
ygr7	yellow-green plant
Ygr	yellow-green plant
Ypt	yellow petal
Ysc	yellow seed coat

5. RCBC Seed Stocks - Arranged by species & phenotypic category

This catalog is regularly added to and revised as referenced by the date code in the upper right corner of the document.

Uses, **U**, references, **R**, and internet search key words, **K**, are listed for some stocks.

Detailed descriptions of seed stocks and their uses can be found as PDF files under the **Seed Stock Document, SSD**, section.

Genetic terminology and symbols used in this catalog can be found on pages 2-4.

Species *Brassica rapa*, Type, rapid cycling, RBR (40 days, seed to seed)

Individual plants are self-incompatible. Stocks are produced by intermating (pollinating) or mass crossing populations of more than 40 individuals. Stocks are true breeding for specified phenotypes except for segregating stocks, e.g. F2, test crosses, quantitative traits etc. Many distinctive phenotype stocks have been combined with **male sterile**, *mst2,* to facilitate mass crosses. Genome is Aaa unless otherwise noted. RBR is phenotypically responsive to environmental variables, e.g. temperature, nutrition, and light.

Standard Rapid Cycling Population

Stock #	Phenotype/Genotype	Description	Notes
1-1	**Base population**, BPO	Original rapid cycling base population, contains maximum genotypic variation	**R**: Williams P.H., C. B. Hill, *Science*, **232**, 1385-1389 (1986).
1-33	**Standard rapid cycling**, RCI	RCI, means rapid cycling ideotype or ideal form. RCI phenotype is selected for uniformity in flowering time and plant form. Forty days seed to seed, 14 days sowing to flowering. Standard, RCI, is the common genetic background of most RBR mutants.	**R**: Musgrave, M.E. J Plant Growth Regul , 19, 314-325 (2000). Stock contains considerable quantifiable variation.

Plant Form Mutants

Stock #	Phenotype/Genotype	Description	Notes
1-59	**Astroplant**, *dwf1/dwf1,* Asp(5-10-15)	Special selection of dwarf petite, *dwf1,* developed for use on the Space Shuttle and International Space Station. Phenotype selected to yield ≥5 pods per plant within 10 centimeters of height when pollinated 15 days after seeding, (5-10-15).	**R**: Musgrave, M.E. J Plant Growth Regul , 19, 314-325 (2000)
1-77	**Dwarf petite**, *dwf1/dwf1,* **Purple anthocyanin**, Pan(8)	Plant parts reduced in size, *dwf1*. Plant hue is darker green than standard, *dwf1*. Strong expression of purple anthocyanin, Pan(8). *dwf1* /+, exhibits partial expression, see, stocks 1-139 & 1-140.	

(Plant Form Mutants)

Stock #	Phenotype/Genotype	Description	Notes
1-86	**Dwarf petite**, *dwf1/dwf1,* **purple anthocyanin**, Pan(8), **male sterile**, *mst2/1:1*	Plant parts reduced in size, *dwf1*. Plant hue is darker green than standard. Strong expression of purple anthocyanin, Pan(8). *mst2/1:1*, denotes that half of plants in the population are male sterile, having vestigial anthers lacking pollen; the other half are male fertile, *MST2/mst2*.	
1-74	**Dwarf petite**, *dwf1/dwf1*, **anthocyaninless**, *anl/anl*, Pan(8), **male fertile**, *MST2/-*	Plant parts reduced in size, *dwf1*. Plant hue is darker green than standard. Plants lack any purple anthocyanin pigment, *anl*, however, genetic background of stock is for high expression of purple anthocyanin, Pan(8), a quantitative trait. Most plants, >80%, in the stock are male fertile, *MST2/-*, some are male sterile, *mst2*.	
1-75	**Dwarf petite**, *dwf1/dwf1*, **anthocyaninless**, *anl/anl*, Pan(6), **yellow green**, *ygr/ygr*, **male fertile**, *MST2/-*	Plant parts reduced in size, dwf1. Plants lack any purple anthocyanin pigment, *anl*, however, genetic background of stock is for expression of purple anthocyanin, Pan(6), a quantitative trait. Plant hue is yellow green, *ygr*, but less bright yellow than when expressed in a standard, wildtype, *DWF1*, background. Most plants, >80%, in the stock are male fertile, *MST2/-*, some are male sterile, *mst2*.	
1-21	**Dwarf intermediate**, *dwf2/dwf2*	Plant height significantly reduced from standard, RCI. Leaves and flowers are similar in size to standard. Plant stem elongation is insensitive to exogenous application of gibberellin.	
1-145	**Elongate internodes**, *ein/ein,* **purple anthocyanin**, Pan(5), **male fertile**, *MST2/-*	Hypocotyl and internodes are elongate, *ein*. Plants are significantly taller than standard and need staking. Phytochrome B mutant. The expression of purple anthocyanin is intermediate, Pan(5). Most plants, >80%, in the stock are male fertile, *MST2/-,* some are male sterile, *mst2*.	**K**: Rcbr, phytochrome; Rcbr, gibberellin.

(Plant Form Mutants)

Stock #	Phenotype/Genotype	Description	Notes
1-130	**Elongate internodes,** *ein/ein*, **purple anthocyanin**, *Pan(5),* **male sterile**, *mst2/1:1*	Hypocotyl and internodes are elongate, *ein*. Plants are significantly taller than standard and need staking. *ein* is a Phytochrome B mutant. The expression of purple anthocyanin is intermediate, Pan(5). *mst2 /1:1*, denotes that half of plants in the population are male sterile, having vestigial anthers lacking pollen.	**K:** Rcbr, phytochrome; Rcbr, gibberellin
1-40	**Fused cotyledon**, Fct, and **fused calyx**, Fca.	Margins of cotyledons and petioles are more or less fused to form cone-shaped structures, Fct. Fused cotyledons, Fct, are commonly associated with Fca, fusion of sepal margins creating a tubular calyx, that restricts petal and anther emergence.	
1-131	**Rosette**, *ros/ros*, **purple anthocyanin,** Pan(8)	Extreme shortening of internodes, creating rosette plant form, *ros*. Growing plants respond to exogenous gibberellin application by exhibiting internode elongation. Strong expression of purple anthocyanin, Pan(8)	**K:** Rcbr, gibberellin

Plant Color Mutants

Stock #	Phenotype/Genotype	Description	Notes
1-108	**Anthocyaninless**, *anl/anl*, Pan(7), **hairless**, Hir(1), **male fertile**,*MST2/-*	Plants lack any purple anthocyanin pigment, *anl,* however the genetic background of the stock is for high expression of purple anthocyanin, Pan (7), a quantitative trait. None or very few hairs on any plant part, Hir(1), a quantitative trait. Most plants, >80%, are male fertile, *MST2/-.* A few are male sterile, *mst2*.	

(Plant Color Mutants)

Stock #	Phenotype/Genotype	Description	Notes
1-107	**Anthocyaninless**, *anl/anl*, Pan(7), **hairless**, Hir(1), **male sterile**, *mst2/1:1*	Plants lack any purple anthocyanin pigment, *anl*, however, genetic background of stock is for high expression of purple anthocyanin, Pan(7), a quantitative trait. None or very few hairs on any plant part, Hir(1), a quantitative trait. *mst2 /1:1* denotes that half of plants in the population are male sterile, having vestigial anthers lacking pollen.	
1-63	**Anthocyaninless**, *anl/anl*, Pan(3), **hairs**, Hir(3-6), **male fertile**, MST2/-	Plants lack any purple anthocyanin, *anl*. The genetic background of the stock is for intermediate to low expression of purple anthocyanin, Pan(3), a quantitative trait. Expression of hair on leaves and stems is intermediate and variable, Hir(3-6). Most plants, >80%, are male fertile, MST2/-. A few are male sterile, mst2.	
1-37	**Anthocyaninless**, *anl/anl*, Pan(3), **hairs**, Hir(3-6), **male sterile**, mst/1:1	Plants lack any purple anthocyanin, *anl*. The genetic background of the stock is for intermediate to low expression of purple anthocyanin, Pan(3), a quantitative trait. Expression of hair on leaves and stems is intermediate and variable, Hir(3-6). *mst2 /1:1* denotes that half of the plants in the population are male sterile, *mst2/mst2*, having vestigial anthers lacking pollen.	
1-46	**Anthocyaninless**, *anl/anl*, **yellow-green**, *ygr/ygr*	Plants lack any purple anthocyanin pigment, *anl*. Plants are bright yellow-green, *ygr*.	
1-105	**Anthocyaninless**, *anl/anl*, **yellow-green**, ygr/ygr, **male sterile**, *mst2 /1:1*	Plants lack any purple anthocyanin pigment, *anl*. Plants are bright yellow-green, *ygr*. *mst2 /1:1* denotes that half of plants in the population are male sterile, having vestigial anthers lacking pollen.	
1-45	**Glossy**, *glo/glo*	Stems and pods lack dull waxy bloom, appearing shiny or glossy green, *glo*, less prominent on the leaves.	

(Plant Color Mutants)

Stock #	Phenotype/Genotype	Description	Notes
1-14	**Glossy**, *glo/glo*, **yellow-green**, *ygr3/ygr3*	Stems and pods lack a dull waxy bloom, appearing shiny or glossy green, *glo*, less prominent on the leaves. Plants are pale yellow-green, *ygr3*.	
1-13	**Glossy**, *glo/glo*, **orange-yellow petal**, *oyp/oyp*	Stems and pods lack dull waxy bloom, appearing shiny or glossy green, *glo*, less prominent on the leaves. Petals orange-yellow, *oyp*, particularly when viewed in natural light.	
1-67	**Purple anthocyanin**, Pan(8), **hairs**, Hir(3-6)	High expression of purple anthocyanin, Pan(8), throughout plant; particularly noticeable on the hypocotyl, stem, hydathodes and sepals. Anthocyanin expression is strongly enhanced by environmental factors, e.g. high light and nutrient stress. Intermediate and variable expression of hair on leaves and stems, Hir(3-6). Purple anthocyanin and hairiness exhibit quantitative inheritance.	
1-55	**Purple anthocyanin**, Pan(8), **hairs**, Hir(3-6), **male sterile**, *mst2/1:1*	Purple anthocyanin, Pan(8), denotes high expression of purple anthocyanin, Pan (8), throughout plant; particularly noticeable on hypocotyl, stem, hydathodes and sepals. Anthocyanin expression is strongly enhanced by environmental factors, e.g. high light and nutrient stress. Number of hairs on leaves and stems is intermediate and variable, Hir(3-6). Hair number and purple anthocyanin exhibit quantitative inheritance. *mst2 /1:1* denote that half of plants in the population are male sterile, *mst2/*mst2, having vestigial anthers lacking pollen.	

(Plant Color Mutants)

Stock #	Phenotype/Genotype	Description	Notes
1-28	**Variegation** (cytoplasmic), (Var)	Interspersed large to very small white and green sectors of cells throughout the plant. Variable expression of variegation is visible throughout plant growth. (Var) is inherited uniparentally through the egg. Expression appears to result from variation in number of normal and abnormal chloroplasts that segregate somatically at time of cell division. Large white sectors originate from cell lineages having high proportions of abnormal plastids early in tissue development.	**U**: Illustrating somatic segregation and uniparental inheritance through the egg.
1-120	**Yellow-green**, *ygr/ygr*, **purple anthocyanin**, Pan(8), **hairs**, Hir(5)	Plants are bright yellow-green, *ygr*. Pan (8) denotes a high expression of purple anthocyanin, throughout the plant that is particularly noticeable on hypocotyl, stem, hydathodes and sepals. Anthocyanin expression is strongly enhanced by some environmental factors, e.g. high light and nutrient stress. Number of hairs on leaves and stems is intermediate and variable, Hir(5). Hair number and purple anthocyanin exhibit quantitative inheritance.	
1-16	**Yellow-green**, *ygr3/ygr3*, **orange-yellow petal**, *oyp/oyp*	Plants are pale yellow-green, *ygr*. Petals are orange-yellow, *oyp*, particularly when viewed in natural light.	

Floral Mutants (color and form)

Stock #	Phenotype/Genotype	Description	Notes
1-41	**Apetalous**, *apt/apt*	Flowers are largely without petals, *apt*. On some plants, some flowers have 1 or more petals. Expression of petal number is variable.	
1-93	**Apetalous**, *apt/apt*, **petite dwarf**, *dwf1/dwf1*	Flowers lack petals, *apt*. On some plants, some flowers have 1 or more petals. Expression of petal numbers variable. Parts of petit dwarf plants, *dwf1*, are reduced in size. Plant has a darker green hue than standard.	

(Floral Mutants -color and form)

Stock #	Phenotype/Genotype	Description	Notes
1-40	**Fused calyx**, Fca, **fused cotyledon**, Fct	Fusion of sepal margins creating a tubular calyx restricting normal petal and anther emergence, Fca. Margins of cotyledons and petioles more or less fused to form cone-shaped structures, Fct. Fct and Fca are frequently associated.	
1-12	**Orange-yellow petal**, *oyp/oyp*	Petals orange-yellow, *oyp*, particularly when viewed in natural light.	
1-13	**Orange-yellow petal**, *oyp/oyp*, **glossy**, *glo/glo*	Petals orange-yellow, *oyp*, particularly when viewed in natural light. Stems and pods lack dull waxy bloom, appearing shiny or glossy green, *glo*.. Gloss is less apparent on leaves.	
1-16	**Yellow-green**, *ygr3/ygr3*, **orange-yellow petal**, *oyp/oyp*	Plants are pale yellow-green, *ygr*. Petals are orange-yellow, *oyp*, particularly when viewed in natural light.	
1-20	**Revolute petal**, *rvp/rvp*	Petals strongly folded back on themselves, revolute, in buds and open flowers, *rvp*.	

Reproductive Mutants

Stock #	Phenotype/Genotype	Description	Notes
1-55	**Male sterile**, *mst2/1:1* **purple anthocyanin**, Pan(8), **hairs**, Hir(3-6)	*mst2 /1:1*, denotes that half of the plants in the population are male sterile, having vestigial anthers lacking pollen. Purple anthocyanin, Pan (8), denotes high expression of purple anthocyanin, Pan (8), throughout plant; particularly noticeable on the hypocotyl, stem, hydathodes and sepals. Anthocyanin expression is strongly enhanced by environmental factors, e.g. high light and nutrient stress. Hairy, Hir(3-6) is intermediate and variable expression of hair on leaves and stems. Purple anthocyanin and hair number exhibit quantitative inheritance.	

(Reproductive Mutants)

Stock #	Phenotype/Genotype	Description	Notes
1-107	**Male sterile**, *mst2/1:1* **anthocyaninless**, *anl/anl*, Pan(7), **hairless**, Hir(1)	*mst2 /1:1* denotes that half of the plants in the population are male sterile, *mst2/mst2*, having vestigial anthers lacking pollen. Male sterility, *mst2*, exhibits pleiotropic expression of smaller petals, and shorter time to the first opening of flowers, (by 0.5 – 1 day). Plants lack any purple anthocyanin pigment, *anl*, however, genetic background of stock is for high expression of purple anthocyanin, Pan (7), a quantitative trait. None or very few hairs on any plant part, Hir(1), a quantitative trait.	
1-30	**Cytoplasmic male sterile**, *(Mst1)*	Flowers lack anthers. Stamens are filamentous or petaloid. Emerging growth is pale green, eventually becoming green. Plants are functionally female. Rbr nucleus is substituted in 'Ogura' cytoplasmic male sterile Raphanus sativus cytoplasm. Genome is R1aa. Recurrent male parent in maintaining this stock is 1-67, Pan (8), Hir(3-6), thus purple anthocyanin expression is strong and hairs on leaves and stems are intermediate and variable in number. R1 confers total male sterility because of a mutation in the mitochondrial genome of the cytoplasm of radish.	
1-31	**Cytoplasmic male sterile**, *(Mst2)*	Flowers lack anthers. Stamens are filamentous or petaloid. Plants are functionally female. Rbr nucleus is substituted in 'Anand' cytoplasmic male sterile *Brassica juncea* cytoplasm. Genome is AB1aa. Recurrent male parent in maintaining this stock is 1-67, Pan (8), Hir (3-6), thus purple anthocyanin expression is strong and hairs on leaves and stems are intermediate and variable in number.	

Physiological mutants

Stock #	Phenotype/Genotype	Description	Notes
1-141	**Atrazine resistant**, (Tzr), **anthocyaninless,** *anl/anl,* **hairless**, Hir(1)		

F1 crosses

Stock #	Phenotype/Genotype	Description	Notes
1-124	**F1**, **anthocyaninless**, *anl/ANL*, Pan(6/8), **hairs**, Hir(1/5), **male fertile**, *mst2/MST2*	Phenotypes of F1 plants are wild type, purple, *anl/ANL*, segregating for hair numbers on specified parts, Hir(1/5), and male fertile, *mst2/MST2*. F1 is from the cross [C1-107 x C1-67]	
1-122	**F1**, **anthocyaninless**, *anl/ANL*, Pan(6/8), **yellow-green**, *YGR/ygr*, **hairs**, Hir(1/5), **male fertile**, mst2/MST2	Phenotypes of F1 plants are wild type, purple, *anl/ANL*, normal green, *YGR/ygr*, segregating for hair numbers on specified parts, Hir(1/5), and male fertile, *mst2/MST2*. F1 is from the cross [C1-107xC1-120].	
1-139	**F1**, **anthocyaninless**, *anl/ANL*, Pan(6/8), **dwarf petite**, *DWF1/dwf1*, **hairs**, Hir(1/5), **male fertile**, *mst2/MST2*	Phenotypes of F1 plants are purple, *anl/ANL*, of intermediate plant size (when specific plant parts are measured), *DWF1/dwf1*, segregating for hair numbers on specified parts, Hir(1/5), and male fertile, *mst2/MST2*. F1 is from the cross [C1-107 x C1-77].	

F2 crosses

Stock #	Phenotype/Genotype	Description	Notes
1-123	**F2**, **anthocyaninless**, *anl*, Pan(6/8), **yellow green**, *ygr*, **hairs**, Hir, **male sterile**, *mst2*	Anthocyaninless, *anl*, and purple anthocyanin plants, *ANL/-*, Pan(6/8), and yellow green plant, *ygr*, and normal green plants, *YGR/-* exhibit unlinked F2 segregation patterns. Male sterility, *mst2*, also segregates as an unlinked recessive trait. Hair numbers, Hir, on parts of individual plants, e.g. margin of first true leaf, vary and exhibit quantitative inheritance with measurable heritability. F2 is produced by sib-mating F1, [C1-122].	
1-140	**F2**, **anthocyaninless**, *anl*, Pan(6/8), **dwarf petite,** *dwf1*, **hairs**, Hir, **male sterile,** *mst2*	Segregation of anthocyaninless, *anl,* and purple anthocyanin plants, *ANL/-,* Pan(6/8) and quantitatively measured plant part sizes, *dwf1*, e.g. cotyledon diameter or plant height, exhibit unlinked F2 patterns. Heterozygote, *dwf1/DWF1*, plants are of intermediate size. Male sterility, *mst2*, also segregates as an unlinked recessive trait, showing pleiotropic expression of smaller petals, and earlier flowering. Hair numbers, Hir, on parts of individual plants, e.g. margin of first true leaf, vary and exhibit quantitative inheritance with estimable heritability. F2 is produced by sib-mating F1 [C1-139].	

Test crosses

Stock #	Phenotype/Genotype	Description	Notes
1-128	**Test Cross**, **anthocyaninless**, *anl/-*, **yellow green**, *ygr/-*, **purple anthocyanin**, Pan(6), **hairs**, Hir(1/5), **male sterile**, *mst2/-*	Segregation patterns of anthocyaninless, *anl*, yellow green, *ygr*, recombinants, *anl*, *ygr*, and wild types, exhibit those for dihybrid unlinked traits. Testcross is produced by crossing C1-105 x C1-122.	

Species *Brassica nigra ,* Type, rapid cycling, RBNi (50 days seed to seed)

Individual plants are self-incompatible. Stocks are produced by intermating (pollinating) or mass crossing populations of more than 40 individuals. Genome is Bbb, unless noted.

Standard Rapid Cycling Population

Stock #	Phenotype/Genotype	Description	Notes
2-1	Base population, BPO	Original rapid cycling base population, contains maximum genotypic variation.	**R**: Williams P.H., C. B. Hill, *Science*, **232**, 1385-1389 (1986).

Species *Brassica oleracea*, Type, rapid cycling, RBO (60 days, seed to seed)

Individual plants vary in self-incompatibility. Stocks are produced by intermating (pollinating) or mass crossing populations of more than 40 individuals. Stocks are true breeding for specified phenotypes except for segregating stocks, e.g. F2, test crosses, quantitative traits etc. Genome is **Ccc** unless otherwise noted.

Standard Rapid Cycling Population

Stock #	Phenotype/Genotype	Description	Notes
3-1	Base population, BPO	Original rapid cycling base population, contains maximum genotypic variation.	**R**: Williams P.H., C. B. Hill, *Science*, **232**, 1385-1389 (1986).

Species *Brassica juncea*, Type, rapid cycling, RBJ (45 days, seed to seed)

Genome is ABaabb unless otherwise noted.

Standard Rapid Cycling Population

Stock #	Phenotype/Genotype	Description	Notes
4-1	Base population, BPO	Original rapid cycling base population, contains maximum genotypic variation.	

Species *Brassica napus*, Type, rapid cycling, RBN (50 days, seed to seed)

Genome is ACaacc unless otherwise noted.

Standard Rapid Cycling Population

Stock #	Phenotype/Genotype	Description	Notes
5-1	Base population, BPO	Original rapid cycling base population, contains maximum genotypic variation.	

Species *Brassica carinata*, Type, rapid cycling, RBC (50 days, seed to seed)

Genome is BCbbcc unless otherwise noted.

Standard Rapid Cycling Population

Stock #	Phenotype/Genotype	Description	Notes
6-1	Base population, BPO	Original rapid cycling base population, contains maximum genotypic variation.	

Species *Raphanus sativus*

Standard Rapid Cycling Population

Stock #	Phenotype/Genotype	Description	Notes
7-1	Base population, BPO	Original rapid cycling base population, contains maximum genotypic variation.	

6. Seed Orders - Rapid Cycling Brassica Collection

Seed orders are accepted by **E-mail** (rcbc@plantpath.wisc.edu, please put word "Brassica" in subject), **Fax** (608-263-0744), **Telephone** (608-263-2634), or **Mail** (Wisconsin Fast Plants, RCBC, University of Wisconsin-Madison**,** Dept of Plant Pathology, 1630 Linden Dr, Madison, WI 53706).

Cost is $10.00 per unit of 100 seeds.

Packaging Seeds will be packaged in bulk.

Shipping & handling is $5.00 for orders going to the US or Canada; $10.00 for other orders. Expedited shipment will be made if requested, with the cost being added to the invoice. Please indicate requirements for customs, if any.

Payment: Payment must be by **check**, made out to **Wisconsin Fast Plants**. Please include the invoice number on the check.

To place an order with the Rapid Cycling Brassica Collection, provide the information below:

The invoice will be sent to the mailing address with the seed shipment unless you indicate otherwise. If you have a purchase order for this order, check "Purchase Order" below and fill in the appropriate information. If your billing address is different from your mailing address, please include that information.

☐ **Just Bill Me** ☐ **Purchase Order** P.O. number_____, P.O. date_____

Mailing Information

Name:_____
Institution:_____
Department:_____
Street Address _____
City:_____ State (Province):____
Postal Code:_____ Country:_____

Billing Information

Name:_____
Institution:_____
Department:_____
Street Address _____
City:_____ State (Province):____
Postal Code:_____ Country:_____

Contact Information Email:_____ Telephone:_____
Fax:_____

Research/Educational Information The RCBC staff would like to know how you use the seeds you have ordered. Please include a brief description below.

_____

_____

Seed Order

RCBC No.	Stock Description	# of Seeds	# of units (100 seeds/ unit)	Price/unit ($10.00)	Amount Due

Note: Based on germination rate, extra seeds are added so you receive the number of germinating seeds you ordered.

Total for seeds _____
Shipping & Handling _____
Total Due _____