# A PRELIMINARY GENE LIST IN BRASSICA OLERACEA

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Easily recognised genes giving simple Mendelian ratios can be valuable to the breeder as purity markers within inbred lines and as aids in determining sib proportions in hybrid cultivars. At another level the labour required to assess segregating populations for such characteristics as self-incompatibility, disease resistance or male-sterility, might be considerably reduced by the use of linkages to suitable morphological markers. It is important therefore that breeders and pathologists should be aware of the range of known genes, and also be prepared to investigate novel phenotypes, especially when these are associated with genes that it is desired to exploit in breeding procedures.

A selected list of genes in *B. oleracea* is appended. Genes known or suspected to be difficult to work with and disease resistance genes have not been included and the descriptions are brief. Almost all of the genes listed and all of the linkage groups have been described since the comprehensive reviel of the cytogenetics of *B. oleracea* by Yarnell (1956). The original isolator or the authors of published data are noted in parentheses following gene description but full references are omitted for brevity.

The conventional symbolism is generally similar to that used for tomato and in the publications of Sampson. Genes are denoted by a two letter symbol derived from their descriptive name except where a single letter has precedence; alleles within a series are distinguished by a following superscript usually chose to indicate the source of the allele; non-allelic genes having the same phenotype are distinguished by numbers, in addition dominant glossy foliage genes are distinguished from recessives by different symbols.

Additions to the list would be welcome and seeds of mutant material would be greatly appreciated.

## GROUP A. SEEDLING CHARACTERS

1. **A** **Anthacyanin development.** Dominant. Allelic series (Linkage Group II)

   $A^{rc}$, red cabbage, intense

   $A^{pb}$, purple broccoli, moderately intense

   $A^{mk}$, marrow-stem kale, moderately intense

   aa, hyptocotyl faintly pigmented, traces on first leaf

2. **C** **Anthacyanin suppressor.** Recessive. Pigmentation suppressed in all parts.

   c-1, curly kale and variegated ornamental kale (Sampson) (LG V)

   c-2, “The Cluseed” Brussels sprout (Sampson) (LG VI)

   c-3, marrow-stem kale (Sampson)

3. **Hr** **Hairy-leaf.** Dominant. Hairs typically on margins of young leaves, sometimes more widely distributed. Penetrance and expressivity variable.

Hr-1, marrow-stem kale, margins only (Thompson) (LG IV)

Hr-2, marrow-stem kale, additional short hairs on underside of mid-rib (Thompson) (LG IV)

Hr-3, margins only (Wills) (LG VII)

4. **G1** **Glossy Foliage.** Recessive. Wax on leaf surfaces and stems more of less inhibited.

G1-1, sprouting broccoli (Anstey) (LG I)

G1-3, "The Cluseed" Brussels sprout (Priestley) (LG VI) ($g1_1$, of Priestley)

G1-4, cauliflower (Sampson)

At least four further genes known (Priestley; Wills)

5. **Go** **Glossy Foliage.** Dominant.

Go-1, "Green Glaze" collard (Priestley)

Go-2, broccoli; (G1-5 of Sampson)

6. **Fu** **Fused catyledon.** Recessive. Outer edges of catyledons fused to form funnel.

fc-1, "Cambridge Special" Brussels sprout (Wills)

7. **Al** **Albino**

At least three different loci (Wills)

Al-1, (Wills) (LG VII)

8. **Pg** **Pale-green foliage.** Recessive. Yellow-green true leaves, reduced vigour

pg-1, green sprouting broccoli (Sampson) (LG III)

pg-2, green sprouting broccoli (Sampson) (LG IV)

pg-3, Brussels sprout (Johnson)

9. **Fn** **Fern leaf.** Partial Dominant. Leaves lobed or dissected. Marrow-stem kale. (Thompson) (LG VI)

10. **Le** **Leaf excrescence.** Recessive. Pimply or vein-like outgrowth on upper leaf surface. (Sampson).

11. **Rd** **Retarded development.** Recessive. Laminae narrow, margins incurved, slow growth rate (Wills)

12. **Pz** **Pilzkaimlinge.** (Mushroom seedling). Recessive. Cotyledones small, fleshy, swollen hypocotyl and plumule (Heyn)

13. **Dw** **Dwarf.** Recessive. Many isolates.

dw$^{fb}$, "Flora Blanca" cauliflower. Short internodes, rounded leaves (Crisp)

## GROUP B. FLOWERING PLANT CHARACTERS

14. **Wh** **White petal.** Dominant. (Anstey) (LG I)

15. **Cr** **Cream petal.** Recessive. (Anstey) (LG III)

16. **Cp** **Crinkly petal.** Recessive. Double fold across petals, flower bud pear-shaped (Priestley) (LG III)

17. **An** **Anther spot.** Dominant. Ubiquitous. Purple spot on anther tip (Thompson and Taylor) (LG II)

18. **Ps** **Persistent sepals.** Sepals remain green and adhere after petal fall (Sampson) (LG II)

19. **Ms** **Male-sterile.** Several isolates.

ms-1, broccoli (Sampson) (LG V)

ms-2, brussels sprout (Sampson)

ms-3, purple cauliflower (Borchers)

ms-6, broccoli (Dickson)

20. **S** **Self-incompatibility.** Multiallelic (LG II)

21. **Or** **Orange-curd.** Dominant. Extra-early Snowball cauliflower (Crisp and Walkey)

## GROUP C. BIOCHEMICAL CHARACTERS

22. **Acp** **Acid pnesphatase.** Isoenzyme system; many loci.

acp-1, five co-dominant alleles in seeds, no hybridge molecules (Te Nijenhuis)

acp-2, two co-dominant alleles in seeds, no hybrid molecules (Woods &Thurman)

acp-3, approximately sic co-dominant alleles in seedlings and older plants, hybrid molecules in heterozygotes (Wills and Wiseman)

## Reference

Yarnell, S.H. (1956). Cytogenetics of the vegetable crops II. Crucifers Bot. Rev. 22, 81-166.