**Dihybrid analysis**

***A.   Number of kernel rows and striped leaves in barley (Hordeum vulgare).***

|  |  |  |  |
| --- | --- | --- | --- |
| **Generation:** | Parent 1 |   | **Parent 2** |
| **Genotype:** | VV/WW |   | vv/ww |
| **Phenotype:** | Two-row |   | Six-row |
|   | Normal seedling |   | White stripe seedling |
| **Generation:** |   | F1 |   |
| **Genotype:** |   | Vv/Ww |   |
| **Phenotype:** |   | Two-rowNormal seedling |   |

In the OWB DH population, the expected frequencies of female gametes used to produce haploid plants are:

|  |  |  |  |
| --- | --- | --- | --- |
| 0.25 V W | 0.25 Vw | 0.25 vW | 0.25 vw |

After chromosome doubling, this would give the genotypic ratio:

1 *VV*/*WW*; 1 *VV*/*ww*; 1 *vv*/*WW*; 1 *vv*/*ww*

and the phenotypic ratio: 1 two-row/normal:1 two-row/white stripe: 1 six-row/normal: 1 six-row/white stripe.

***B. Example: Fruit orientation and male sterility (nuclear) in pepper.***

|  |  |  |  |
| --- | --- | --- | --- |
| Generation:  | Parent 1  | X   | Parent 2  |
| Genotype:  | *upupmsms* |  | *up+up+MsMs* |
| Phenotype:  | Fruit upright Male sterile   |  | Fruit hangs down Male fertile  |
| Generation:  |  | F1   |  |
| Genotype:  |  | *up+upMsms*  |  |
| Phenotype  |  | Fruit hangs down; male fertile  |  |
|  |  | X  |  |
| Generation |  | F2  |  |
| Genotypes |  | See below  |  |
| Phenotypes: |  | 9:3:3:1 (see below)  |  |

*Punnett square for fruit orientation and male fertility*

|  |  |  |
| --- | --- | --- |
| P1  |  | P2  |
| up+up+msms  | X   | upupMsMs  |
| gametes  |  | gametes  |
| up+ms  |   | upMs  |
|  |  |  |
| F1  | up+upMsms   |  |
|  | (self fertilization)   |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *male gametes (pollen)* | *.25up+Ms* | *.25up+ms* | *.25upMs* | *.25upms* |
| **female gametes** |  |  |  |  |
| **.25 up+Ms** | .0625up+up+MsMs down/fertile  | .0625up+up+Msms down/fertile  | .0625up+upMsMs down/fertile  | .0625up+upMsms down/fertile  |
| **.25 up+ms** | .0625up+up+Msms down/fertile | .0625up+up+msms down/sterile | .0625up+upMsms down/fertile | .0625up+upmsms down/sterile |
| **.25 upMs** | .0625up+upMsMs down/fertile | .0625up+upMsms down/fertile | .0625upupMsMs up/fertile | .0625upupMsms up/fertile |
|  |  |  |  |  |
| **.25 upms** | .0625up+upMsms down/fertile | .0625up+upmsms down/sterile | .0625upupMsms up/fertile | .0625upupmsms up/sterile |

*Genotypic ratio:* 1up+up+MsMs: 2up+up+Msms:1up+up+msms:2up+upMsMs:4up+upMsms:2up+upmsms:1upupMsMs:2upupMsms:1upupmsms

*Phenotypic ratio:* 9 down/fertile; 3 down/sterile: 3 up/fertile: 1 up/sterile.