**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-row  Normal 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.