Dihybrid analysis - level 2

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:

$$1 \text{ } VV/WW; 1 \text{ } VV/ww; 1 \text{ } vv/WW; 1 \text{ } vv/ww$$

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		Fruit hangs down

	Male sterile		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.