

# Predicted\_dose\_response\_per\_drug.R

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```
##Analysis were based on three different concentrations per acaricide
#i.e. alpha-cypermethrin at 0.002%, 0.02%, and 0.5%; amitraz at 0.002%, 0.1%, and 0.25%
#and ivermectin at 0.01%, 0.1%, and 0.5% for the minimum, medium or discriminatory
#and maximum doses, respectively. In general, the three acaricide products show
#resistance in all levels
```

```
library(drc)
```

```
## Loading required package: MASS
##
## 'drc' has been loaded.
##
## Please cite R and 'drc' if used for a publication,
## for references type 'citation()' and 'citation('drc')'.
##
##
## Attaching package: 'drc'
##
## The following objects are masked from 'package:stats':
##
##   gaussian, getInitial
```

```
Predicdrug<-read.csv("totalresist.csv",header = T,sep = ";", dec = ",")
```

```
Predicdrug
```

```
##           Localidad finca           droga conc totalX
## 1           Los Bancos Fin 1           amitraz 0.002 100.50
## 2           Los Bancos Fin 1           amitraz 0.100  98.75
## 3           Los Bancos Fin 1           amitraz 0.250 100.25
## 4           Los Bancos Fin 1 alpha-cypermethrin 0.002 101.25
## 5           Los Bancos Fin 1 alpha-cypermethrin 0.020 100.50
## 6           Los Bancos Fin 1 alpha-cypermethrin 0.500 107.50
## 7           Los Bancos Fin 1           ivermectin 0.010 101.00
## 8           Los Bancos Fin 1           ivermectin 0.100  88.25
## 9           Los Bancos Fin 1           ivermectin 0.500  89.50
## 10          Los Bancos Fin 2           amitraz 0.002  89.50
## 11          Los Bancos Fin 2           amitraz 0.100 101.50
## 12          Los Bancos Fin 2           amitraz 0.250 101.00
## 13          Los Bancos Fin 2 alpha-cypermethrin 0.002 110.50
## 14          Los Bancos Fin 2 alpha-cypermethrin 0.020 105.00
## 15          Los Bancos Fin 2 alpha-cypermethrin 0.500 106.25
## 16          Los Bancos Fin 2           ivermectin 0.010 100.00
## 17          Los Bancos Fin 2           ivermectin 0.100 101.75
## 18          Los Bancos Fin 2           ivermectin 0.500  80.50
## 19          Los Bancos Fin 3           amitraz 0.002 110.75
```

## 20	Los Bancos	Fin 3	amitraz	0.100	119.50
## 21	Los Bancos	Fin 3	amitraz	0.250	120.00
## 22	Los Bancos	Fin 3	alpha-cypermethrin	0.002	109.25
## 23	Los Bancos	Fin 3	alpha-cypermethrin	0.020	123.75
## 24	Los Bancos	Fin 3	alpha-cypermethrin	0.500	102.25
## 25	Los Bancos	Fin 3	ivermectin	0.010	99.25
## 26	Los Bancos	Fin 3	ivermectin	0.100	108.75
## 27	Los Bancos	Fin 3	ivermectin	0.500	114.25
## 28	Santo Domingo	Fin 4	amitraz	0.002	94.75
## 29	Santo Domingo	Fin 4	amitraz	0.100	95.25
## 30	Santo Domingo	Fin 4	amitraz	0.250	97.25
## 31	Santo Domingo	Fin 4	alpha-cypermethrin	0.002	92.50
## 32	Santo Domingo	Fin 4	alpha-cypermethrin	0.020	93.75
## 33	Santo Domingo	Fin 4	alpha-cypermethrin	0.500	90.25
## 34	Santo Domingo	Fin 4	ivermectin	0.010	97.50
## 35	Santo Domingo	Fin 4	ivermectin	0.100	98.75
## 36	Santo Domingo	Fin 4	ivermectin	0.500	93.25
## 37	El Carmen	Fin 5	amitraz	0.002	95.75
## 38	El Carmen	Fin 5	amitraz	0.100	95.00
## 39	El Carmen	Fin 5	amitraz	0.250	94.50
## 40	El Carmen	Fin 5	alpha-cypermethrin	0.002	94.50
## 41	El Carmen	Fin 5	alpha-cypermethrin	0.020	101.00
## 42	El Carmen	Fin 5	alpha-cypermethrin	0.500	93.75
## 43	El Carmen	Fin 5	ivermectin	0.010	97.50
## 44	El Carmen	Fin 5	ivermectin	0.100	95.25
## 45	El Carmen	Fin 5	ivermectin	0.500	98.25
## 46	El Carmen	Fin 6	amitraz	0.002	106.00
## 47	El Carmen	Fin 6	amitraz	0.100	118.25
## 48	El Carmen	Fin 6	amitraz	0.250	108.00
## 49	El Carmen	Fin 6	alpha-cypermethrin	0.002	114.25
## 50	El Carmen	Fin 6	alpha-cypermethrin	0.020	115.75
## 51	El Carmen	Fin 6	alpha-cypermethrin	0.500	106.75
## 52	El Carmen	Fin 6	ivermectin	0.010	96.50
## 53	El Carmen	Fin 6	ivermectin	0.100	101.25
## 54	El Carmen	Fin 6	ivermectin	0.500	94.75
## 55	El Carmen	Fin 7	amitraz	0.002	96.25
## 56	El Carmen	Fin 7	amitraz	0.100	99.00
## 57	El Carmen	Fin 7	amitraz	0.250	92.50
## 58	El Carmen	Fin 7	alpha-cypermethrin	0.002	121.75
## 59	El Carmen	Fin 7	alpha-cypermethrin	0.020	92.50
## 60	El Carmen	Fin 7	alpha-cypermethrin	0.500	93.00
## 61	El Carmen	Fin 7	ivermectin	0.010	83.25
## 62	El Carmen	Fin 7	ivermectin	0.100	100.25
## 63	El Carmen	Fin 7	ivermectin	0.500	95.00
## 64	Santo Domingo	Fin 8	amitraz	0.002	102.25
## 65	Santo Domingo	Fin 8	amitraz	0.100	114.50
## 66	Santo Domingo	Fin 8	amitraz	0.250	107.75
## 67	Santo Domingo	Fin 8	alpha-cypermethrin	0.002	106.25
## 68	Santo Domingo	Fin 8	alpha-cypermethrin	0.020	120.00
## 69	Santo Domingo	Fin 8	alpha-cypermethrin	0.500	106.75
## 70	Santo Domingo	Fin 8	ivermectin	0.010	112.75
## 71	Santo Domingo	Fin 8	ivermectin	0.100	118.75
## 72	Santo Domingo	Fin 8	ivermectin	0.500	106.75
## 73	Santo Domingo	Fin 9	amitraz	0.002	117.50

## 74	Santo Domingo	Fin 9	amitraz	0.100	106.75
## 75	Santo Domingo	Fin 9	amitraz	0.250	110.75
## 76	Santo Domingo	Fin 9	alpha-cypermethrin	0.002	126.50
## 77	Santo Domingo	Fin 9	alpha-cypermethrin	0.020	107.50
## 78	Santo Domingo	Fin 9	alpha-cypermethrin	0.500	118.25
## 79	Santo Domingo	Fin 9	ivermectin	0.010	117.25
## 80	Santo Domingo	Fin 9	ivermectin	0.100	116.75
## 81	Santo Domingo	Fin 9	ivermectin	0.500	114.50
## 82	Pedro Vicente Maldonado	Fin 10	amitraz	0.002	102.25
## 83	Pedro Vicente Maldonado	Fin 10	amitraz	0.100	107.50
## 84	Pedro Vicente Maldonado	Fin 10	amitraz	0.250	117.25
## 85	Pedro Vicente Maldonado	Fin 10	alpha-cypermethrin	0.002	108.75
## 86	Pedro Vicente Maldonado	Fin 10	alpha-cypermethrin	0.020	112.00
## 87	Pedro Vicente Maldonado	Fin 10	alpha-cypermethrin	0.500	105.75
## 88	Pedro Vicente Maldonado	Fin 10	ivermectin	0.010	120.25
## 89	Pedro Vicente Maldonado	Fin 10	ivermectin	0.100	109.25
## 90	Pedro Vicente Maldonado	Fin 10	ivermectin	0.500	106.50
## 91	Pedro Vicente Maldonado	Fin 11	amitraz	0.002	111.00
## 92	Pedro Vicente Maldonado	Fin 11	amitraz	0.100	106.25
## 93	Pedro Vicente Maldonado	Fin 11	amitraz	0.250	110.50
## 94	Pedro Vicente Maldonado	Fin 11	alpha-cypermethrin	0.002	78.00
## 95	Pedro Vicente Maldonado	Fin 11	alpha-cypermethrin	0.020	109.00
## 96	Pedro Vicente Maldonado	Fin 11	alpha-cypermethrin	0.500	99.50
## 97	Pedro Vicente Maldonado	Fin 11	ivermectin	0.010	113.25
## 98	Pedro Vicente Maldonado	Fin 11	ivermectin	0.100	98.00
## 99	Pedro Vicente Maldonado	Fin 11	ivermectin	0.500	107.00
## 100	Pedro Vicente Maldonado	Fin 12	amitraz	0.002	111.50
## 101	Pedro Vicente Maldonado	Fin 12	amitraz	0.100	118.00
## 102	Pedro Vicente Maldonado	Fin 12	amitraz	0.250	124.50
## 103	Pedro Vicente Maldonado	Fin 12	alpha-cypermethrin	0.002	84.75
## 104	Pedro Vicente Maldonado	Fin 12	alpha-cypermethrin	0.020	122.25
## 105	Pedro Vicente Maldonado	Fin 12	alpha-cypermethrin	0.500	107.00
## 106	Pedro Vicente Maldonado	Fin 12	ivermectin	0.010	99.25
## 107	Pedro Vicente Maldonado	Fin 12	ivermectin	0.100	125.75
## 108	Pedro Vicente Maldonado	Fin 12	ivermectin	0.500	109.50
##	muertosX	vivosX			
## 1	44.75	55.75			
## 2	54.00	44.75			
## 3	72.50	27.75			
## 4	92.00	9.25			
## 5	90.25	10.25			
## 6	106.00	1.50			
## 7	59.00	42.00			
## 8	57.25	31.00			
## 9	61.75	27.75			
## 10	87.00	2.50			
## 11	96.00	5.50			
## 12	98.25	2.75			
## 13	72.00	38.50			
## 14	84.25	20.75			
## 15	90.50	15.75			
## 16	54.00	46.00			
## 17	58.50	43.25			
## 18	54.00	26.50			

## 19	15.00	95.75
## 20	19.50	100.00
## 21	26.25	93.75
## 22	103.00	6.25
## 23	118.75	5.00
## 24	98.25	4.00
## 25	10.75	88.50
## 26	21.50	87.25
## 27	31.75	82.50
## 28	49.25	45.50
## 29	48.00	47.25
## 30	47.75	49.50
## 31	43.25	49.25
## 32	43.50	50.25
## 33	87.00	3.25
## 34	95.25	2.25
## 35	95.75	3.00
## 36	91.50	1.75
## 37	64.00	31.75
## 38	72.00	23.00
## 39	76.25	18.25
## 40	77.75	16.75
## 41	88.75	12.25
## 42	86.25	7.50
## 43	86.75	10.75
## 44	86.50	8.75
## 45	92.00	6.25
## 46	48.25	57.75
## 47	56.75	61.50
## 48	59.00	49.00
## 49	86.25	28.00
## 50	92.00	23.75
## 51	98.25	8.50
## 52	93.00	3.50
## 53	98.25	3.00
## 54	93.25	1.50
## 55	80.25	16.00
## 56	83.25	15.75
## 57	82.00	10.50
## 58	92.00	29.75
## 59	89.00	3.50
## 60	89.00	4.00
## 61	78.25	5.00
## 62	93.50	6.75
## 63	93.75	1.25
## 64	92.75	10.75
## 65	104.75	9.75
## 66	104.75	3.00
## 67	103.75	2.50
## 68	115.25	4.75
## 69	104.25	2.50
## 70	111.00	1.75
## 71	117.75	1.00
## 72	106.25	0.50

```
## 73      50.25  67.25
## 74      54.00  52.75
## 75      61.00  49.75
## 76     122.25   4.25
## 77     105.75   1.75
## 78     116.75   1.50
## 79      59.00  58.25
## 80      64.50  52.25
## 81      75.50  39.00
## 82      99.50   2.75
## 83     104.75   2.75
## 84     115.25   2.00
## 85      52.50  56.25
## 86      95.75  16.25
## 87     102.75   3.00
## 88     118.75   1.50
## 89     108.00   1.25
## 90     106.00   0.50
## 91      67.50  43.50
## 92      71.00  35.25
## 93      84.00  26.50
## 94      77.00   1.00
## 95     107.50   1.50
## 96      98.75   0.75
## 97     110.75   2.50
## 98      96.25   1.75
## 99     105.75   1.25
## 100     93.75  17.75
## 101     107.50  10.50
## 102     116.00   8.50
## 103     82.75   2.00
## 104     120.25   2.00
## 105     105.75   1.25
## 106     85.50  13.75
## 107     110.00  15.75
## 108     95.75  13.75
```

```
Predicdrug.ll<-drm(vivosX/totalX~conc, droga, data=Predicdrug, fct = LL.5(), weights = totalX, type="b
op <- par(mfrow = c(1, 1))

plot(Predicdrug.ll,broken = T,xlab = "concentrations (%)",
      xlim = range(Predicdrug$conc), ylim = c(0,0.4), ylab = "Resistance (%)", col=c("red", "black", "blue"),
      cex.legend = 0.7, lty=1, lwd=1)
```

