

Survival of The Wood White butterfly

The Wood White is a butterfly that lives in woodland glades and clearings and lays its egg on various plants in the vetch family (related to Peas). A female Wood White might lay up to 60 eggs if the weather is fine, and the eggs will hatch after 10-20 days (depending on the temperature). Many eggs are eaten by insects or attacked by tiny parasitic wasps, so that only a small percentage of those laid even hatch into the first larval stage. The caterpillars are eaten by birds even though they are very well camouflaged.

Dr Martin Warren studied a number of Wood White eggs laid in each of the three years and followed their progress through the four larval stages to the pupa stage. The larvae of the Wood White seem to stay in one small area for the first three stages of their life, then in the fourth stage they begin to move off, spreading out to feed and eventually finding somewhere in the dead leaf layer on the ground to form pupae. When they start to move about, they become extremely hard to follow. Added to this, the pupae are almost impossible to find!

The studies of the hatching rate of the pupae was done by putting pupae in marked places and counting how many of them survived until the Wood White butterflies hatched out.

The table below shows the results of the study of Wood White survival over a period of three years. The instars are the stages in the caterpillar's development.

So of the 201 eggs laid in 1978 (see the middle column), only 7 adults emerged successfully the following year. The % mortality of the eggs is the % of eggs that did not survive to hatch that year and that figure was 44.78%.

Mortality is calculated as the percentage of each stage that dies without reaching the end of the next stage.

butterfly's life stage	Year of study					
	1977-78		1978-79		1979-80	
	Numbers	% mortality	Numbers	% mortality	Numbers	% mortality
Eggs laid	185		<u>201</u>		155	
		31.35		44.78		26.45
First Instar	127		111		114	
		43.31		50.45		33.33
Second Instar	72		55		76	
		27.78		34.55		18.42
Third Instar	52		36		62	
		69.23		63.88		69.35
Fourth Instar -	16		13		19	
		12.50		18.75		26.31
Pupae	14		16		12	
		57.14		56.25		41.67
Adults emerged	6		7		7	

Data from Martin Warren, Butterfly Conservation

Look at the table above and draw a bar graph to compare the % mortalities at the six stages for the three different years. The % mortalities should be on the vertical axis of the graph.

Complete the table below to show the overall success rate of the Wood White over the three years:

Year of study	A. Number of eggs laid	B. Number of adults emerged	C. % success rate = $B/A \times 100$
1977-78		6	
1978-79	201	7	$7/201 \times 100 = 3.48\%$
1979-80	155		

Questions for you to answer

1. What was the average success rate from egg to butterfly over the 3 years?
2. What was the average mortality rate over the three years?
3. Which stage in the life cycle of the Wood White has the highest mortality?
4. As a large number of fourth instar larvae disappear, how might this explain the figures?
5. What are the main predators of Wood White larvae?