intramuscularly would uniformly kill adult guinea pigs in 24 to 48 hours. 0.25 cc either failed to kill or was fatal only after 4 or 5 days. Differences in body weight had no apparent effect on these amounts.

Inasmuch as hamsters are finding increasing use as laboratory animals because of their greater susceptibility to many infections, it was decided to compare their susceptibility to that of guinea pigs. Recently weaned pigs were employed so their weight would be closer to that of the young adult hamsters, although the possibility of some passive immunity from the sow would have to be considered. However, within two weeks of weaning their susceptibility has been found identical to that of adults.

TABLE 1

Amount*	Weight	cc Kg	Inoculation route	Results
		GUINEA PIGS		
0.3 cc	200.5 gms	1.49	Axilla	Dead in 24 hrs.
0.25 "	195.5 "	1.27	"	Dead in 48 hrs.
0.2 "	143.5 "	1.39	"	Survived
0.15 "	219.5 "	0.68	"	"
0.5 "	209.5 "	2.38	Orally	"
		HAMSTERS		
0.2 cc	71. gms	2.81	Thigh	Dead in 48 hrs.
0.1 "	55. "	1.81	"	" " " "
0.05 "	49.5 "	1.01	"	" " " "
.01 "	51.5 "	0.19	"	Survived
.001 "	61.5 "	0.01	"	"
0.3 "	50.5 "	5.94	Orally	"

* 48 hr. Hibler culture *Cl. chauvei.*

Table 1 again indicates that the M. L. D. for guinea pigs can not be stated in terms of body weight but exists as an animal unit. Hamsters were found to be more susceptible to *Cl. chauvei* infection than guinea pigs, succumbing to one fifth the lethal dose required for guinea pigs on an animal unit basis.

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THE GERMICIDAL EFFICIENCY OF EMULSEPT AND OF CHLORINE IN WASHING DIRTY EGGS[1]

RESULTS of previous experiments performed in this laboratory on the germicidal efficiency of one of the new types of quaternary ammonium cationic compounds, namely emulsept, have been reported by us.[2] At the same time Zagaevsky and Lutikova published data on the germicidal efficiency of chlorine in disinfecting egg shells.[3] This present paper concerns the comparative values of chlorine and emulsept as germicides in washing dirty eggs.

A. K. Epstein *et al.* have indicated that emulsept, which is the lauric acid ester of colamino formyl methyl pyridinium chloride, has the low toxicity index of 0.6[4] and that the compound, in addition to being a good detergent, is colorless, odorless and non-irritating to the skin.[5]

EXPERIMENTAL METHODS

Eggs used in our experiments were candled out at the receiving station as medium to heavy dirty eggs, the shell surfaces of which were covered with soil, chicken excreta, feathers, straw and egg meat.

Two types of controls were used for later washings with emulsept and chlorine. First, 72 dozen heavy dirty eggs were washed in 6 liters of tap water in 6 groups of 12 dozen each. After washing each 12 dozen eggs the number of organisms present in the wash water was determined by plate counts. Second, from each group, 6 eggs (2 from the top, middle and bottom of the pail) were transferred to 600 ml of sterile water. The jars were rotated rapidly in order to swirl the water over the egg-shell surfaces. This water was then plated, incubated at 30° C. for 3 days and the number of colonies of microorganisms counted. The counts from these plates gave an indication of the number of organisms carried over on each egg shell from the dirty wash water into the rinse water. Seven trials of each series were made for both methods and the results were averaged to be used as controls.

When the eggs were washed with the disinfectants the same procedures were followed with the exception

TABLE 1

COMPARISON OF GERMICIDAL EFFICIENCY OF EMULSEPT AND CHLORINE IN WASHING DIRTY EGGS

Germicide used	Successive groups of 12 dozen eggs each	Percentage of microorganisms not killed by germicide in relation to the number of microorganisms present when no disinfectant was used		Average concentration of germicide remaining
		In rinse water	In wash water	
Emulsept 0.04 per cent.	1	0.26	0.24	*
	2	1.12	0.90	
	3	3.52	3.13	
	4	3.73	6.97	
	5	8.00	33.00	
	6	17.58	36.65	
Chlorine 100 ppm	1	20.28	12.70	4 ppm
	2	13.80	10.54	0.4
	3	40.80	52.45	0.0

* When these experiments were conducted no method had been devised to measure the amount of emulsept remaining in the wash water.

[1] Preliminary report.

[2] V. Penniston and L. R. Hedrick, *U. S. Egg and Poultry Mag.*, 50: 26, 1944.

[3] J. S. Zagaevsky and P. O. Lutikova, *U. S. Egg and Poultry Mag.*, 50: 17, 1944.

[4] A. K. Epstein, B. R. Harris and M. Katzman, *Proc. Soc. Exp. Biol. and Med.*, 53: 238, 1943.

[5] A. K. Epstein, B. R. Harris, M. Katzman and S. Epstein, *Oil and Soap*, 20: 171, 1943.

that (1), 8 trials each with emulsept and chlorine were made rather than 7 as in the controls, and (2), with 100 ppm active chlorine it had been found by preliminary experiments to be necessary to use only 3 groups of the 12 dozen eggs rather than 6 groups. The percentages of microorganisms (in relation to the number in the controls) remaining in the rinse water and in the wash water after using the two different disinfectants are given in Table 1.

SUMMARY

The percentages of microorganisms killed with emulsept in these experiments for the same series of eggs are many times greater than the percentages of those killed when 100 ppm active chlorine was used. Experiments are in progress on other phases of this problem.

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NEW MATERIALS FOR DELAYING FRUIT ABSCISSION OF APPLES

IN experiments performed in 1939,[1] growth-regulating chemicals as sprays proved highly successful in delaying the harvest drop of apples. Of a number of compounds tested, naphthaleneacetic acid, naphthaleneacetamide and the metallic salts of naphthaleneacetic acid have proved to be the most outstanding in effectiveness. Extensive use of these sprays by orchardists has been exceedingly helpful in reducing losses from harvest drop of apples and pears. However, the limited period of effectiveness of the sprays (usually from 10 days to 3 weeks), with consequent necessity of rather exact timing of the applications, has been the major difficulty in the successful use of these sprays. To increase both the duration and the intensity of the effect of such a spray application, the action of some compounds not heretofore tested was determined in the fall of 1944.

EXPERIMENTAL RESULTS

The data, expressed as accumulated per cent. drop at frequent intervals following the spray applications on Winesap apples are shown in Table 1. Until 15 days after treatment both naphthaleneacetic acid treatments, with and without the addition of Carbowax (a polyethylene glycol), were highly effective in preventing fruit drop. While 4-chlorophenoxyacetic acid and 2,4,5 trichlorophenoxyacetic acid reduced drop significantly during this period, these treatments were not so effective as the 2,4 dichlorophenoxyacetic acid spray. Beginning 15 days following application, the rate of fruit drop with the naphthaleneacetic acid treatment showed a marked increase, and by 17 days the effect of the treatment had been almost or entirely dissipated, since the fruit drop from that date until the completion of the experiment was at approximately the same rate as for the untreated trees. The addition of Carbowax to naphthaleneacetic acid, however, considerably extended both the intensity and duration of effect. The rate of fruit drop for trees receiving this treatment did not approximate the rate of drop for the untreated trees until 23 days after application. The 2,4 dichlorophenoxyacetic acid treatment, while somewhat less effective than the naphthaleneacetic acid treatments for a considerable period following the spray applications, was effective over a period nearly double that of naphthaleneacetic acid alone, and several days longer than for naphthaleneacetic acid plus Carbowax. On October 30, when the fruit was harvested, most of the apples on the trees receiving 2,4 dichlorophenoxyacetic acid treatment were firmly attached to the spurs, and while pulling them off was not difficult, there was no suggestion that the fruit was any "looser" than it had been several weeks earlier. In contrast to this condition, the fruit on the trees of the next most effective treatment (naphthaleneacetic acid plus Carbowax) would drop from the tree at the slightest touch.

TABLE 1

EFFECT OF GROWTH-REGULATING CHEMICALS ON HARVEST DROP OF WINESAP APPLES

Spray treatment	Average accumulated per cent. drop Days following spray application					
	7	11	15	19	23	28
.001 per cent. naphthaleneacetic acid	0.6	1.4	5.3	29.7	36.4	61.8
.001 per cent. naphthaleneacetic acid + 0.5 per cent. Carbowax .	0.8	1.3	2.7	12.9	16.3	41.4
.001 per cent. 2,4 dichlorophenoxyacetic acid	1.9	5.3	10.7	18.1	19.4	24.9
.001 per cent. 4 chlorophenoxyacetic acid .	1.7	8.4	22.7	39.1	44.4	59.8
.001 per cent. 2,4,5 trichlorophenoxyacetic acid	1.7	8.4	21.0	39.9	45.9	64.6
Control	4.0	15.9	35.4	54.4	59.5	72.9
Difference necessary for significance at 5 per cent. point			7.7		11.8	11.0

DISCUSSION

In this experiment the addition of 0.5 per cent. Carbowax to naphthaleneacetic acid significantly increased both the intensity and the duration of effect. Results with the 2,4 dichlorophenoxyacetic acid treatment offer considerable promise as a means of extending the effective period of fruit-drop sprays. In order to obtain effectiveness with this compound comparable to naphthaleneacetic acid immediately following treatment, several possibilities suggest themselves: (1)

[1] F. E. Gardner, P. C. Marth and L. P. Batjer, SCIENCE, 90: 208–209, 1939.