

Insects as Biological Weapons

)DKD10]L&KDXGK0XKDPPDG)DKHHP 0DOLN 0XB010K0EVLXVVDLQ
'HSDUWPHQW RI =RRORJ\ 8QLYHUVLW\ RI *XMUDW +DIL] +D\DW &DPSXV 3DNLVWDQ
&RUUHVSROXW0]0DKDG 10KIDUXGKHUSDUWRH0R0R0QLYH0RVXWU0DWL] +D&DPSX*XMUDWLV7H0Q (PDLO
IDKDGQD]LUFK #JPDLO FRP
5HFHLYHG\$SDW0 \$FFHSHWG GDWH 3XEOLVKHGXGDWH
&RSULJKW &KDXGK0DUH0 7K0RSHQ DFFHVV0E0WUK0QW0KH0HUR0W0K0UHD0W0R0R0QW0WUL0X0W0Z0BL0SK0
XQUHVWULFWHG XVH GLVWULEXWLRQ DQG UHSURGXFWRQ LQ DQ\ PHGLXP SURYLGHG WKH RULJLQDO D

\$EVWUDFW
7KLV VWXG\ ZDV FRQGXFWHG DW 8QLYHUVLW\ RI *XMUDW GXULQJ Ži%ŸQ7KH GDW
YDULRXV SXEOLVKHG DUWLFOHV RI LQWHUQDWLRQDO UHSXWHG MRXUQDOV DQQ
DQG H ERRNV 8VH RI HQWRPRORJLFDO ZHDSRQV LV D ZLGH ILHOG RI UHVHDFK
IURP DQFLHQW WLPHV DQG WKLV FRQFHSW LV YHU\ ROG 'LIIHUHQW LQVHFVW F
,QVHFVW FDQ EH XVHG DV ELRORJLFDO ZHDSRQV DJDLQVW FURSV DQLPDOV DQG
SHVWV DJDLQVW FURS RU WKH\ PD\ EH XVHG DV YHFWRUV WR VSUHDG GLVHDVHV
WKHLU HIIHFWV DUH GHYDWDWLQJ +RXVH)OLHV 2ULHQWDO 5DW)OHD &RORU
WKH H[DPSOHV RI VRPH LQVHFVW ZKLFK FDQ EH XVHG DV ELRORJLFDO ZHDSRQV
KXPDQV LV KRZHYHU LOOHJDO

.HIZRUG%LRORJLFDO ZHDSRQV (QWRPRORJLFDO ZDUIDUH \$JUR
WHUURULVP DQG /HJDO VWDWXV

,QWURGXFWRQ

LVFRQFHSW RI XVLQJ LQVHFVW DV ELRORJLFDO ZHDSRQV LV YHU\ ROG DQG
HYHQ WRGD\ UHVHDFK RQ WKLV WRSLF LV FDUULHG RXW E\ PDQ\ FRXQWULHV ,
WK FHQWXU\ LQ \$VLD 0LQRU SODH0D0ZRLFK ZDV VSUHDG WKURXJK
NQRZQ DV EODFN GHDWK ZDV WKH RQ WKH RI HDUOLHVW HYHQW RI XVLQJ LQVHFVW
ELRORJLFDO ZHDSRQV LW ZDV XVH0E0L0 &ULPHDQ DJDLQVW WKH FLW\ RI
\$QRWKHU HDUOLHVW XVH RI LQVHFVW DV ELRORJLFDO ZHDSRQV E\ HDUOLHVW
KXPDQV ZDV WKH XVH RI EHHV IRU GLUHFV DWWDFN > @ -DSDQ DQG PDQ\
RWKHU FRXQWULHV ZUH DFFXVHG RI XVLQJ (QWRPRORJLFDO ZDUIDUH LQ :RUOG
:DU H RQ0H0LV0E0 RI (QWRPRORJLFDO ZDUIDUH RQ ODUJH VFDOH LV
E\ -DSDQHVH DJDLQVW &KLQHVH LQ :RUOG :DU ,W LV W\SH RI ELRORJLFDO
ZDUIDUH > @ ,Q (: LQVHFVW DUH XVHG DV D GLUHFV DWWDFN RU XVHG DV YHFWR
WR VSUHDG GLVHDVHV WKURXJK DJHQW > @

+LVWRU\

,QVHFVW DUH EHLQJ XVHG DV ELRORJLFDO ZHDSRQV VLQFH DQFLHQW WLPHV ,G
WK FHQWXU\ XVHG WR VSUHDG SODH0D0H DJDLQVW WKH FLW\ RI
\$VLD 0LQRU > @ ,Q :RUOG :DU *HUPDQV XVHG &RORUDGR EHHWOH DJDLQVW
HQHP\ FURSV > @ -DSDQHVH HDUOLHVW0D0R0S0D0 JXH LQIHFWHG
LQIHFWHVH DJDLQVW &KLQHVH LQ :RUOG :DU > @ 0DQR FHE€

HvHFW@)UHQFK HQWRPRORJLVVW DOVR FRQFOXGHG WKDW &RORUDGR EHHWOH
FDQ EH XVHG DV ELRORJLFDO ZHDSRQ DJDLQVW HQHP\ FURSV > @ 'XULQJ
&ROG ZDU &,\$ ZDV DOVR EODPHG WR XVH LW DJDLQVW VRYLHW FURSV > @
&RORUDGR EHHWOHV DUH VHQW E\ 86\$ WR %ULWDLQ LQ WR VWXG\
WKHP DV D ELRORJLFDO ZHDSRQ > @

2ULHQWDO 5DW)OHD

,W LV WKH YHFWRU RI PXULQH W\SKXV DQG EXERQLF SODJXH DQG WKHVH
GLVHDSHV DUH WUDLQV W\WHGLRORVWKH QH[W E\ WKHLU
HJJV > @ -DSDQHQHGDWJHHWFDQ DV D ELRORJLFDO ZHDSRQ
DJDLQVW &KLQHVHLV SURJGDZDV OHW E\ /W *HQHUDO
6KLU ,V\LVSOJXDV GURSSHGSDORZ RQ
WKH FLW\ RI &KDJGH DQG FDXVHG SODJXH ZKLFK UHVXOWHG LQ GHDWK
RI &KLQHVH > @

+RXVH)O\

+RXVHFDQ DFW DV D OHWKDO ELRORJLFDO ZHDSRQ ,W LV YHFWRU RI XS
GLVHDSHV RI SDWKRJHQV ZKLFK FDQ FDXVHV GLVHDSHV OLNH FKROHUD
W\SKRLG VDOPRQHOORVLV DQWKUD[WXEHUFXORVLV RSKWKDOPLF EDFLOOD
G\VHQWHU\ DQG SDUDVLWLF ZRUBVHWHQWDOVR LPSRUWDQW YHFWRU RI
YLUXVHV OLNH SROLRP\HOLWLV HQWHURYLUXVHV DQG YLUDO KHSDWLWLV >
6RPH VWUDLQV RI HUHVLVWDQW WR PDQ\ NLQGV RI SHVWLFLGHV
FRPPRQ\ XVHG > @ -DSDQHVHHDVQ XVHG FKROHUD LQIHFWHG
HQWRPRORJLFDO ZHDSRQ DJDLQVW &KLQHVH WR VSUHDG GLVHDSHV GXULQJ :RUOG
:DU > @

7LFNV

7LFNV FDQ DOVR EH XVHG DV ELRORJLFDO ZHDSRQ WR VSUHDG
GLVHDSHV LQ SRXOWp`W,LQFL •đÀp€A VUHQWVWKLR R ĩHb@B D@ R 0Ñ•5 ÀPL7€ PG PÀ

~LHM SURGXFHG LQ ODUJH VFDOH LQ ODERUDWRU\ FDQ EH XVHG DV DQWL
OLYHVWRFN ELRORJLFDO ZHDSRQ

6FUHZ :RUP)O\

6FUHZ ZRUP DOVR EH XVHG DV ELRORJLFDO ZHDSRQ DJDLQVW
OLYHVWRFN DQLPDOV ZKRWHLV DSUDYDHLVQIHFVWV RQ RSHQ
ZRXXQGV RI ZDUP EORRGHGDQYDHOVWDFN RQO\
KHDOWK\ OLYLQJ WLTVVXH RI WKHLU KRVW ,W LV PDMRU SHVW RI FDWWOH DQG
OLYHVWRFN DQLPDOV > @ 6FUHZ ZRUP FDQ FDXVH WLTVVXH ORVV YLWDO RUJD
GHVWUXFWLRQ DQG HYHQ GHDWK LQ H[WUHPH FDVHV > @ 6FUHZ ZRUP IHPDOH
FDQ OD\ XS WR HJJV LQ KHU OLIHF\FOH DQG WUDYHO XS WR NP LQ WKH
VHDFK RI KRVW > @

/HJDO VWDWXV RI HQWRPRORJLFDO ZHDSRQV

,QVHFW YHFWRUV DUH QRW PHQWLRQHG LQ WKH WH[W RI %LRORJLFDO DQG 7R[L
:HDSRQV &RQYHQWLRQ %:& RI +RZHYHU YHFWRUV DUH FRYHUHG LQ
WUHDW\ > @ 8VH RFRQFLWUWRVWLDPB&USRVHV LV
EDQQHG E\ DUWLFOH RI %:& > @ 6R %:& FRYHUV LQVHFW YHFWRUV
> @ +RZHYHU WKH XVH RI XQLQIHFWHG LQVHFWV DJDLQVW FURSV LV QRW FOHD
> @

&RQFOXVLRQ DQG 5HFRPPHQGDWLRQV

8VH RI LQVHFWV DV ELRORJLFDO ZHDSRQV LV YHU\ FKHDS DQG
ZDUHFDQ HDVLO\ EH XVHG WR VSUHDG GLVHDVH DPRQJ HQHP\ DQG WR
GHVWUR\ HQHP\ FURSV DQG OLYHVWRFN %XW XQOLNH FRQYHQWLRQDO ZHDSRQV
WKH\ DFW VORZO\ DQG WKHLU XVH LQ ZDU LV LOOHJDO DQG FRQVLGHUHG DV ZD
FULPH VR WKUH VKRXOG EH ODZV DQG UHJODWLRQV WR SURKLELW WKHLU
SUROLIHUWLRQ RU HURDORXWKXOG ZDU FKHFN DQG
EDODQFH WR SUHYHQW ELRORJLFDO ZHDSRQV JRLQJ LQWR KDQGV RI WHUURULV
DQG WR EH XVHG WR VSUHDG WHUURULVP \$LUSRUW VHFXULW\ DQG H[SRUW DQ
LPSRUW VHFXULW\ VKRXOG DOVR EH LQFUHDVHG VR WKDW ELRORJLFDO ZHDSRQ
PD\ QRW EH VPXJJOHG IURP RQH FRXQWU\ WR DQRWKHU IRU WKLV SXUSRVH
WKUH VKRXOG EH HQWRPRORJLFDO H[SHUVV LQ DQWL WHUURULVP LQYHVWLJDV
WHDPV ERUGHUV DQG DLUSRUW VHFXULW\ WHDPV

5HIHUFHV

.LUE\ 5HLG ~H[WUHPH\

