

# Insects as Biological Weapons

)DKDIDJL&KDXGKDU\KDKDPPDG )DKHHP 0DOLN 0XEDIDKIDFVXLVVDLQ  
'HSDUWPHQW RI =RRORJ\ 8QLYHUVLW\ RI \*XMUDW +DIL] +D\DW &DPSXV 3DNLVWDQ  
&RUUHVSRODQWQ)DKDG 18KIDUXGKHUSDUWRHQRORQALYHRVIXMU-EDWL] +D&DPSX\*XMUDWLV7HDDQ ( PDLO  
IDKDGQD]LUFK #JPDLO FRP  
5HFHLYHG\$SDWQ \$FFHSHWG GDWH 3XCEOLVKHGXGDWH  
&RSULJKW &KDXGKDU\HW DO 7KDRSHQ DFFHVVGEOWUKDQGWKGHURIWK&HUHDWRPFRQWWULEXFWQZBLFSH  
XQUHVWULFWHG XVH GLVWULEXWLRQ DQG UHSURGXFWLRQ LQ DQ\ PHGLXP SURYLGHG WKH RULJLQDO DQ

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

.HIZRUG%LRORJLQDO ZHDSRQV (QWRPRORJLQDO ZDUIDUH \$JUR  
WHUURULVP DQG /HJDO VWDWXV

## ,QWURGXFWRQ

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

## +LVWRU\

,QVHFVW DUH EHLQJ XVHG DV ELRORJLQDO ZHDSRQV VLQFH DQFLHQW WLPHV ,G  
WK FHQWXU\ XVHG WR VSUHDG SODHIDQ DJDLQVW WKH FLW\ RI  
\$VLD 0LQRU > @ ,Q :RUOG :DU \*HUPDQV XVHG &RORUDGR EHHWOH DJDLQVW  
HQHP\ FURSV > @ -DSDQVH HDUOLHVWFRQFHSW DJXH LQIHFWHG  
LQIHFWHGDJDLQVW &KLQVH 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\WHGLRORRORRQ WKH QH[W E\ WKHLU  
HJJV > @ -DSDQHQHGDWJHHWFDH 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 ZRUBVHWLQWDOVR LPSRUWDQW YHFWRU RI  
YLUXVHV OLNH SROLRP\HOLWLV HQWHURYLUXVHV DQG YLU DO KHSDWLWLV >  
6RPH VWUDLQV RI HUHVLVWDQW WR PDQ\ NLQGV RI SHVWLFLGHV  
FRPPRQ\ XVHG > @ -DSDQHVHDOVRQ 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 VUHQVWLRQ R ĩHb@B B@ 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 DQLPDOVZKRWHLVDSYUDHLLVQHFVWV RQ RSHQ  
ZRXQGV RI ZDUP EORRGHGDQYDHOVWDFN RQO\  
KHDOWK\ OLYLQJ WLVVXHV RI WKHLU KRVW ,W LV PDMRU SHVW RI FDWWOH DQG  
OLYHVWRFN DQLPDOV > @ 6FUHZ ZRUP FDQ FDXVH WLVVXH 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

,QVHFV YHFWRUV DUH QRW PHQWLRQHG LQ WKH WH[W RI %LORJLFDO DQG 7R[L  
:HDSRQV &RQYHQWLRQ %:& RI +RZHYHU YHFWRUV DUH FRYHUHG LQ  
WUHDW\ > @ 8VH FRQFLWUWRVWLDP&USRVHV LV  
EDQQHG E\ DUWLFOH RI %:& > @ 6R %:& FRYHUV LQVHFV YHFWRUV  
> @ +RZHYHU WKH XVH RI XQLQHFWHG LQVHFV DJDLQVW FURSV LV QRW FOHD  
> @

&RQFOXVLRQ DQG 5HFRPPHQGDWLRQV

8VH RI LQVHFV DV ELRORJLFDOZHWLQV 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 UHXODWLRQV WR SURKLELW WKHLU  
SUROLIHUWLRQ RU HURDORXWK&XLOGZDU FKHFN DQG  
EDODQFH WR SUHYHQW ELRORJLFDO ZHDSRQV JRLQJ LQWR KDQGV RI WHUURULV  
DQG WR EH XVHG WR VSUHDG WHUURULV \$LUSRUW VHFUXLW\ DQG H[SRUW DQ  
LPSRUW VHFUXLW\ 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 WHUURULV LQYHVWLJDV  
WHDPV ERUGHUV DQG DLUSRUW VHFUXLW\ WHDPV

5HIHUFHV

.LUE\ 5HLG ~H[WUHPH`

