

Effects of Climatic and Agronomic Factors on Yield and Quality of Bread Wheat

ugngev k q p " q h " u,q og " q h " v i q " hcev q tu " ycu " f q p q o " v i g " en k ocv k e " hcev q tu " y j k ng " uggt " tcvg c p f p k vt g q p " hgtv k x ct k q wu " y q tmgtu " k y " e q wnt dg e q p enwfgt v j cv tc k p hcn mg { " hcev q tu " v l cv " j k i j n { " k p hnwg p eg v j g " uvcvg " q h swch k v { q h " uggtfu 0

.H\ZRUG\KHDW 6HHG TXDOLW\ 5DLQBDWHD 7HPHUDWXUH 6HHG
1LWURJHQ

, Q W U R G X F W L R Q

: KHDWULWLFXP DHVWLJXKRPZQ RQ PLOOLRQ KHFWDUHV
FRQVWLWXWLQJ SHUFHQW RI WKH ZRUOGdV DUDEOH ODQG PRUH ODQG DUH
WKDQ DQ\ RWKHU FURS DQG LW LV JURZQ LQ DOPRVW DOO FRXQWULHV DQG
FOLPDWHV ,W LV WKH VWDSOH IRRG IRU ELOOLRQ SHRSOH LQ RYHU FRXQWU
ZRUOGZLGH ,W KDV WKH KLJKHVW FRQWHQW RI SURWHLQ RI DOO WKH VWDSOH FI
DQG FRQWDLQV HVVHQWLDO PLQHUDOV YLWDPLQV DQG OLSLGV ,W LV WKH SUL
VRXUFH RI SURWHLQ LQ GHYHORSLQJ FRXQWULHV ZKHUH ELOOLRQ SHRSOH DU
GHSHQGHQW RQ ZKHDW IRU VXUYLYDO > @ ,W KDV EHHQ SURMHFWHG WKDW WH
GHPDQG IRU ZKHDW LQ WKH GHYHORSLQJ ZRUOG ZLOO LQFUHDVH SHUFHQW EI
ZKLFK LV D VREHULQJ IRUHFDVW FRQVLGHULQJ JOREDO ZKHDW \LHOGV KDYH
UHPDLQHG FRQVWDQW IRU PRUH WKDQ D GHFDGH > @

\$ UHFHQW DQDO\VLV E\F-BQQH\PHD\ LDOJUR@WWDV DOVR
LQ ZKHDW FRQVXPSSLRQ DV D FRQVHTXHQFH RI XUEDQL]DWLRQ ULVLQJ
LQFRPHV DQGYGLUW\WUDWDLVRQHUQ DQG 6RXWKHUQ \$IULFD
+RZHYZHU WKH SURGXFWLYLW\ RI WKH EUHDG ZKHDW UHPDLQV ORZ LQ WKHVH
FRXQWULHV DV FRPSDUHG WR ORZHZ\ZROGGSB\HUDJH \LHOG
KHFWDUH LV DWWULEXWHG WR PDQ\ IDFWRUV VXFK DV XQDYDLODELOLW\ RI TXD
VHHG IRU YDULHWLHV WKDW DUH KLJK \LHOGLQJ DV ZHOO DV DGDSWHG WR ZLGH
RI DJUR HFRORJLHV RI WKH FRXQWU\ XVH RI SRRU TXDOLW\ VHHGV SRRU TXDOLW\
RI IDUPHU VDYHG VHHGV DQG SRRU DJURQRPLF SUFWLFHV DUH VRPH RI WKH
IDFWRUU > @

&OLPDWLF FRQGLWLRQV DQG WKH FRXUVH "S~\L @ ...p KH

DvHFW

'L V F X V V L R Q

6 H O H F W H G F O f l e d g e W \ L F H D D G F W \ R Q G V T X D O L W \ R I Z K H D W
V H H G
(v H F R W U D L Q I D O O R Q E U H D G Z K I Q D H W W W K H I H G V L I H O G D Q G T X D O L W \

GHFUHDVHV JUDLQ ZHLJKW DQG VKULQNVQZK PWD[KH]DHRQH PSHQ WLRQGVH TAFVAFH LW VPDOOHU DQG VKULYHOHG JUDLQV SURGXFWHG PDLOHH RWKOH EURLSJRWJRDQG WHLDEG LQVW XVHG DV VHHG IRU QH[W FURS > @ WKH VLHM[QGLFDWHV WKDW WKH QHHG WR UDWH LQ HDFK JURZLQJ DUHD DV RQH :KHDW VHHGD[WDWQD]VH KUWHPHDXUDWXUH PDDQDH[PQWWR]LPSURYH \LHOG HDQG LQGLVHUHQRMWK ORFDWLRQ\OOLQ[QFQHJDJLQJ LPSRTHPQHW LQ \LHOG DQG TXDOLW\ WHPSHUDWXUH LQLWLQDXQHBFKDHGH\ SBRW[QHFRQWHQW LQHQFRXUDJHVQXWULHQW DYDLODELOLW\ HPHFKDQLVPV XQGHUO\LQZIKQFKH[WDH]SKRWVQWKHVLYJRRGVRLOHOYLURQH SURWHLQ FRQWHQW KDYH EHHQ SRVWQODWHG DYLPRKGHUDWHOKLJKYRLO WHPSHUDWXUH SURPRWHV QLWURJHQ XSWDNH IURP WKH VRLO DQG QLWURJHQ U WUDQVORFDWLRQ IURP WKH YHJHWDWLWYH [HSF]VQWVWURJWQH[IW]LQDQMLRQHQS WHPSHUDWXUH IRU SURWHLQ ELRV\QW KSHPVLQJ LWKHD UP RKLWKHPSW[Q]QACK-DXWQURQH DSS ELRV\QWKHMWIRPQHGDWHO\ KLJK WHPUSRWWBMLQKFRQWGQMLQJ 1IHUWLQJHU DSS JUDLQOLQD\ VLPXODWH VHHG SURWHH[QWV]KLQVWBLQGDQUBMWHQW LQ KLJKH UHPREOLJDWLRQ IURP YHJHWDWLWYH RSDQDQVDWRUVJYDMDVO E[X]VQIPDQFWKBSFLHDFH[D SKRWV\QWKHVLV DQG KLQGHU ERWK VBSRKHFFVQYSHZDKONGRDQHDXQWFLUQVH[Q]VHDLW DQG WKH WUDQVORFDWLRQ RI FDUERK\JGUDDQWVUH[VQ]YHFDKULLRRHYUH[VW]WSLURHWRILW WR WKH JUDLQ WKHUHE\ LQFUHDVLQJ VHHG SURWHLQ FRQWHQW > @ + RZHYZGDLO\ PD[LXPXP WHPSHUDWQH[KH]GEQJWKH GXUDWLRQ RI JUDLQ RQ JHQHVLV UHVXOW LQ D FKDQJH LQ SURWHLQ FRPSRVLWL SURGXFH VKULYHOHG JUDLQV FRQWDLQLQJ D KLJKHU SURSRUWLRQ RI EUDQ DQG WKXV UHGXFH WKH ZKHDW TXDOLW\ > @

6HOHFHGW DJU[REQ]P[LEHI]GWDRQGV TXDOLW\ RI
EUHDG ZKHDW VHHG

(vHFRW VHHG UDWH RQ \LHOG \$QGDTQDXQHGLWHRG ZKHDW VHHG UDWHV VLDQH\}DBQW LQ WKH VHHG SURGXFWLRQ VVWHP RI ZKHDW :KHDW YDULH\WVH]DWDWVWR LYQDULRXV OHYHOV RI VHHG UDWHV 6HHGD[H]W SODQW SRSXODWLRQ QXDEQV RI WLOOHUV P ZHLJKW DQG WRWDO VHHG \LHOG \$PDQXOODK HW DO > @)ORRG HW DO > IRXQG WKDW UDWHV\JRHQV]HDXQWVHDG VHHG ZHLJKW WKH ORZHVW UDWH SURGXFLQJ WKH KHDYLHVW VHHGV \$JUHLQJ ZLW WKLV 2WWHVRQ HW DO > @ UHSRUWHG WKDW ORZ VHHG UDWH PD\ UHVXOW LQ WLOOHUV PRUH VSLNHOHW SHU VSLNH KLJK VHHG \LHOG ZKHUHDV LQDSSURSUL VHHG UDWH OHGV WR ORZL\LHOG XDHQWRS KRLJKTDXDOLW\ VHHG VHHG UDWH OHGV WR ORZL\LHOG XDHQWRS KRLJKTDXDOLW\ VHHG VSLNH OHQJWK ORZHU QXPEHU RI JUDLQV SHQVSLNH DQG VPDOO VLJHG VHQH[QH]QH FURS VRZQ ZLWK EROGHU VHHGV ODUJHU VHHGV KDG KLSKHU VHHG JHUPLQDWLRQ DV FRPSDUHG WR WKH FURS VRZQ ZLWKR[PDXQDQW]H>VH[GWHSRUW VKRZV WKDW EROGHU VHHGV UHSUHVHQW WKH VHHG TXDOLW\ WKDW UHVXOWHG L JHUPLQDWLG VHHGOLQJ DV FRPSDUHG WR WKRVH VRZQ ZLWK UHODWLYHO\ ORZ TXDOLW\ VHHG VPDOO VLJH VHHG > @ 2QH RI WKH LPSRUWDQW FULWHULD LQ VHHG YLJRU LV WKH DPRXQW RI GU\ PDWWHU RU WKH VHHG ZHLJKW 6LQFH JHUPLQDWLRQ DQG VHHGOLQJ HPHUJHQFH UHTXLUHV D ORW RI HQHUI WKDW L SUHSDUHG WKURXJK WKH R[LGDWLRQ RI VHHG VWRUDJHV VHHG VKRXOG KDYH DGHTXDW IRRG VXSSO\ IRU VHHGOLQJ JURZLQJ EHFDXVH VHHGOLQJ XQWLO HQRXJK JURZWK LV GHSHQGHQW WR VHHG > @ .KDQ > @ GRFXPHQWHG WKDW ZLWK LQFUHDVLQJ LQ VHHG ZHLJKW WKH JHUPLQDWLRQ SHUFHQW LQFUHDVHG L WKHUH LV SVLQW]HDXQDWLRQ EHWZHHQ VHHG ZHLJKW DQG VHHG JHUPLQDWLRQ SHUFHQW \$OVR ZLWK LQFUHDVLQJ LQ WKRXVDQG JUDLQ ZHLJKW PHDQ RI JHUPLQDWLRQ WLPH GHFUHDVHG +LJKHVW DQG ORZHVW PHDQ RI JHUPLQDWLRQ WLPH RI ZKHDW ZHUH IRXQG ZLWK ORZHVW DQG KLJKHVW WUHDWPHQW RI WKRXVDQGV JUDLQ ZHLJKW UHVSHFWLYHO\ ,Q OLQH ZLWK WKD *KDULQHK DQG ORVKDWDWL > @ UHSRUWHG IURP WKH[LU VHHGOLQJ JURZWK WHV WKDW ZLWK LQFUHDVLQJ LQ WKH RQV[OLQ]QWZLQ ZHLJKW LQFUHDVHG WKH WUDLWV RI VHHGOLQJ OHQJWQDQWZLQ ZHLJKW GU\ ZHLJKW PRUH VHHGOLQJ ZHLJKW DQG VHHGOLQJ OHQJWK RI WKH KHDY\ VHHGV PLJKW EH DWWULEXWHG WR ODUJH IRRG UHVHUYHV RI WKH VHHGV VRZQ

GHYHORSPHQWDO VWDJH RI WKH SODQW VHHPV WR EH PRUH LPSRUWDQW LQ
LQFUHDVLQJ WKH SURWHLQ FRQWHQW

, V R S U H Q H 6 \ Q W K D Y Q H ~ X S H F Q N E H Y G 7 M P S D H W D W X U H 3 O D Q W