AGRISIM: A Program for Simulating the Agricultural Production Sector of the KPROG2 Human Carrying Capacity Estimation Program for the Humid Tropics

AGRISIM: Um Programa para Simular o Setor de Produção Agrícola do Programa KPROG2 para Estimativa de Capacidade de Suporte Humano nos Trópicos Úmidos

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LISTA DE SUBPROGRAMAS PARA "AGRISIM"

AGRISIM MAIN ("SOILMAIN")

ARAND

BLOCK DATA (para AGRISIM)

BMYLD

BRAND

CAYLD

CBUEFF

CDISEA

EROSN

IDAGYR

IDAYYR

INITSQ

MAXRA

MZYLD

NODIM

PAYLD

PEYLD

RIYLD

PSYLD

SGBQ

SMYLD

SOILLP

SQMNT

SQPASO

SQSCH

SSQOUT

TECHNO

UNBUCH

USECNT

USETOT

VBQ

VBUEFF

VIYLD

WBUEFF

WEABD

WEAGEN

SUBPROGRAMAS DE "AGRISIM" DIFERENTES DOS SUBPROGRAMAS DE "KPROG2"

MAIN ("SOILMAIN" ou "AGRISIM MAIN")	Programa principal
SOILLP (Soil quality "LOTPRO")	no lugar de LOTPRO de KPROG2
SQSCH (Soil Quality Soil Change)	no lugar de SOILCH de KPROG2
SQMNT (Soil quality maintenance)	no lugar de MAINT de KPROG2
SQPASO (Soil quality pasture soils)	no lugar de PASTSO de KPROG2
SSQOUT (soil quality output)	no lugar de SQOUT de KPROG2

A G R I S T M

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C     SOILMAIN - FOR 1 LOT, 9 PATCHES PER LOT MAXIMUM
C     INPUT UNITS : 5=*SOURCE* 14=BANKDATA
C     OUTPUT UNITS ARE: 6=*SINK*
C     15=OUTPUTFILE3 (LAND USE MEASURES LIST)
C     7=OUTPUTFILE4 (SOIL QUALITY LIST FOR ANNUAL CROPS AND PASTURE
C     8=OUTPUTFILE5 (SOIL QUALITY LIST FOR CACAO AND PEPPER)
C
      INTEGER BUTYP, BUQUAL
      DOUBLE PRECISION ELLIM
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE
      COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     1 YLDCA, YLDPA
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/PASTUR/ BASEPY, YREFF(5), PACOEF, PACONS, PACHIP, WGPTDN,
     1 TDNPDM
      COMMON/DISEA/ PINFEC(3, 2), LSPORE(3), IBPOD(1, 9),
     1 IWBROO(1, 9), IFUSAR(1, 9), IWBEST, IFUEST, IBPEST,
     1BPMULT,WBMULT,FUMULT, PRDIES(3)
      COMMON/FERT/ ELLIM(2), DOSECA(4, 2, 3), DOSEPE(4, 2, 4),
     1 PRICFE(5),
     1 PFERT(2), SLOLI, CONSLI, ALLIME, SLOPHO, CONPHO, IFERT(1, 9)
      COMMON/SIZES/ LOTS, NOPCHS, SIZLOT, SIZPCH
      COMMON/DATE/ IYE
      COMMON/MATRIX/ PROB(7, 7, 2)
      COMMON/RANDOM/ INIT
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/LUOUT/ USEOUT(3, 12), LOTUSE(12)
      COMMON/BUCALL/ LLOTV, LYRV, LLOTSG, LYRSG, LLOTW, LYRW
      COMMON/DETERM/ ISTOCH
      COMMON/BUPROB/ BURNPR(3)
      COMMON/UTCOM/ LUMAXB(1, 9), DAYSBA(1, 9), DAYSAC(1, 9),
     1 DAYSTC(1, 9), DAYSPA(1, 9), DAYSFA(1, 9),
     2 RAINBA(1, 9), RAINAC(1, 9)
      COMMON/BURNS/ BUTYP(1, 9), BUQUAL(1, 9)
      COMMON/TECHN/ TECH(9), START(9)
      EXTERNAL ARAND
      WRITE (6, 3033)
 3033 FORMAT(1X, 'ENTER RUN NUMBER (FMT=I3)')
      READ (5, 3034) NORUN
 3034 FORMAT(I3)
      WRITE (6, 3043)
 3043 FORMAT(1X, 'ENTER RUN TYPE: 1=DETERMINISTIC; 2=STOCHASTIC ',
     1 1X, '(FMT=I1)')
      READ (5, 1012) ISTOCH
      READ (14, 1000)((( PROB(I,J,K), I=1,7), J=1,7),K=1,2)
 1000 FORMAT(7F6.2)
C     ABOVE FORMAT 1000 FOR  PROBABILITY MATRIX FOR INITIAL
C     SOIL PH VALUES: I=PH CLASS AFTER MOVE, K=PH CLASS BEFORE MOVE,
C     AND 5=DISTANCE MOVED (100 METERS OR 500 METERS).
      WRITE (6, 1001)
 1001 FORMAT(1X,'ENTER NO. OF YEARS TO SIMULATE (FORMAT=I3)')
      READ (5, 1002) IYEARS
 1002 FORMAT(I3)
 1012 FORMAT(I1)
      LOTS = 1
      READ (14, 2001)
 2001 FORMAT(82(/ 1X))
      READ (14, 3010)((PINFEC(IDIS, IEST), IEST = 1,2), IDIS=1,3),
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     1 (LSPORE(IDI), IDI=1,3), (PRDIES(ID), ID=1,3),
     2 BPMULT, WBMULT, FUMULT
 3010 FORMAT(6F5.2, 3I4, 6F5.2)
C      ABOVE FORMAT 3010  FOR PERENNIAL CROP DISEASE
C      INFORMATION: PROBABILITY OF INFECTION FOR GIVEN PATCH AND YEAR
C      FOR 3 DISEASES (1=FUSARIUM 2=WITCHES BROOM 3=BLACK POD) SEPARATELY
C      BY ESTABLISHMENT STATUS (1=NOT ESTABLISHED IN AREA 2=ESTABLISHED),
C      LIFE OF SPORES OF EACH DISEASE IN YEARS, MULTIPLIER FOR YIELD
C      IF ATTACKED BY BLACK POD, WITCHES BROOM, AND FUSARIUM
       READ (14, 3011)
 3011 FORMAT(248(/ 1X))
       READ (14, 3008) BASEPY,(YREFF(I), I=1,5), PACOEF, PACONS, PACHIP,
     1 WGPTDN, TDNPDM
 3008 FORMAT(F8.1, 7F5.2, F6.2, 2F5.2)
C      ABOVE FORMAT 3008 : BASE PASTURE YIELD (KG DRY
C      WEIGHT/HA/YR FOR VARIETY AT 2 PPM PHOSPHORUS), YEAR EFFECT (PROP.
C      OF FIRST YEAR YIELD FOR 5 YEARS), COEFFICIENT OF PASTURE YIELD ON
C      PHOSPHORUS REGRESSION, CONSTANT TERM OF PASTURE YIELD ON PHOSPHORUS
C      REGRESSION.
       READ (14, 3009) ELLIM(1), ELLIM(2), (((DOSECA(IELC, LEVC, IYCC),
     1 IYCC = 1,3), LEVC = 1,2), IELC=1,4),(((DOSEPE(IELP, LEVP, IYCP),
     2 IYCP = 1,4), LEVP = 1,2), IELP = 1,4),(PRICFE(IFER), IFER=1,5),
     3 (PFERT(IPER), IPER=1,2), SLOLI, CONSLI, ALLIME, SLOPHO, CONPHO
 3009 FORMAT(2F6.1, / 4(6F5.0 /), 4(8F5.0 /), 5F7.2, / 2F6.3, F9.6,
     1F6.3, F5.0, F7.4, F6.2)
C      ABOVE FORMAT 3009  FOR ELEMENT LIMITS FROM FERTILIZATION
C      FOR PHOSPHORUS AND PH, FERTILIZER DOSES FOR CACAO AND FERTILIZER DOSES FOR
C      PEPPER (ELEMENT CODES:  1=PHOS 2=POTAS 3=NITRO 4=MANEUR;  LEVEL OF SOIL
C      NUTRIENT CODES: 1=LOW 2=HIGH;  YEAR CLASS CODES FOR CACAO: 1=FIRST 2=SECOND
C      3=THIRD OR HIGHER;  YEAR CLASS CODES FOR PEPPER:  1=FIRST 2=SECOND
C      3=THIRD 4=FOURTH OR HIGHER), PRICES OF FERTILIZERS (FERTILIZER CODES:
C      1=LIME 2=PHOS 3=POTAS 4=NITRO 5=MANEUR), PROBABILITY OF FERTILIZATION
C      (PERENIAL CROP CODES: 1=CACAO 2=PEPPER), SLOPE OF LIME REGRESSION,
C      CONSTANT TERM OF LIME REGRESSION, LIME DOSE PER UNIT (ME/100G) OF
C      ALUMINUM, SLOPE OF PHOSPHORUS REGRESSION, CONSTANT OF PHOS. REGRESSION
       READ (14, 8050)
 8050 FORMAT(28 (/ 1X))
       READ (14, 6006) (BURNPR(IBT), IBT=1,3)
 6006 FORMAT(3F6.3)
C      ABOVE FORMAT 6006  FOR PROBABILITY OF
C      BURNING BY BURN TYPE (1=VIRGIN  2=SECOND GROWTH  3=WEED)
  202 WRITE (6, 1005)
 1005 FORMAT(1X, 'ENTER NO. OF PATCHES OF ANNUAL CROPS (FMT=I1)')
       READ (5, 1012) NPCHAC
       WRITE (6, 8000)
 8000 FORMAT(1X, 'ENTER NO. OF PATCHES OF PASTURE (FMT=I1)')
       READ (5, 1012) NPCHPA
       WRITE (6, 8004)
 8004 FORMAT(1X, 'ENTER NO. OF PATCHES OF CACAO (FMT=I1)')
       READ (5, 1012) NPCHCA
       WRITE (6, 8005)
 8005 FORMAT(1X, 'ENTER NO. OF PATCHES OF PEPPER (FMT=I1)')
       READ (5, 1012) NPCHPE
       NOPCHS = NPCHAC + NPCHPA + NPCHCA + NPCHPE
       NPMAX = 9
       IF (NOPCHS .GT. NPMAX) GO TO 203
       GO TO 204
  203 WRITE (6, 1006) NPMAX
 1006 FORMAT(1X, 'ERROR: NO. OF PATCHES EXCEEDS DIMENSION OF ', I5)
       GO TO 201
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  204 CONTINUE
      SIZLOT = FLOAT(NOPCHS)
      WRITE (6, 8001)
 8001 FORMAT(1X, 'ENTER FARMED TIME IN YEARS (FMT=I2)')
      READ (5, 8002) IFARYR
 8002 FORMAT(I2)
      WRITE (6, 8003)
 8003 FORMAT(1X, 'ENTER FALLOW TIME IN YEARS (FMT=I2)')
      READ (5, 8002) IFALYR
      WRITE (6, 3029)
 3029 FORMAT(1X, 'ENTER SEED ("0" OR ODD) FOR RANDOM NO. GENERATION',/
     1 1X, '("0" FOR AUTOMATIC),  FMT=I7')
      READ (5, 3030) INIT
 3030 FORMAT(I7)
      SIZPCH = 1.
C     INITIALIZATION OF DISEASES: LAST YEARS IN EACH PATCH AND
C     ESTABLISHMENT IN AREA
      DO 210 ILT = 1, LOTS
      DO 210 IPAT = 1, NOPCHS
      IFERT(ILT, IPAT) = 0
      LUMAXR(ILT, IPAT) = 1
      IBPOD(ILT, IPAT) = 0
      IWBROO(ILT, IPAT) = 0
  210 IFUSAR(ILT, IPAT) = 0
      IWBEST = 1
      IFUEST = 1
      IBPEST = 1
C     INITIALIZATION OF VIRGIN, SECOND GROWTH AND WEED
C     BURN QUALITY LAST LOT AND LAST YEAR INDICATORS
      LLOTV = 0
      LYRV = 0
      LLOTSG = 0
      LYRSG = 0
      LLOTW = 0
      LYRW = 0
      I1 = 1
      DO 101 I2 = 1, NOPCHS
C     INITIAL SOIL QUALITY GENERATION
      CALL INITSQ(I1, I2)
C     INITIALIZATION OF ALL LAND AS VIRGIN
      LUSE(I1, I2) = 1
C     INITIALIZATION OF ALL UTCOM USE CODES
C     DURATION AS ZERO
      IDUR(I1, I2) = 0
C     INITIALIZE CONTINUOUS CULTIVATION COUNTERS AS ZERO
      CONTIN(I1, I2) = 0.
C     INITIALIZE ALL UTCOM CODES AS "NO CATEGORY"
      LASTUS(I1, I2) = 1
  101 CONTINUE
C     CULTIVATION INDICATOR (1=CULTIVATED 2=FALLOW)
      ICULT = 1
C     YEARS CULTIVATED
      IYCUL = 0
C     YEARS FALLOW
      IYFAL = 0
      DO 102 IYR = 1, IYEARS
      YLDBI = 0.
      YLDMZ = 0.
      YLDPS = 0.
      YLDVI = 0.
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181           YLDSM = 0.
182           YLDBM = 0.
183           YLDPE = 0.
184           YLDCA = 0.
185           YLDPA = 0.
186     C     INITIALIZATION OF LAND USE OUTPUT MEASURES
187     C     FOR 3 ITEMS AND 12 LAND USES
188           DO 352 LUIT = 1,3
189           DO 352 LUOM = 1,12
190       352 USEOUT(LUIT, LUOM) = 0.
191     C     TECHNOLOGY IMPROVEMENT ADJUSTMENTS IN BASE YIELDS
192           CALL TECHNO
193     C     FOR FIRST YEAR VIRGIN VALUES OUTPUT
194           IF (IYR .EQ. 1) GO TO 800
195     C     WEATHER GENERATION
196           CALL WEAGEN
197     C     DETERMINATION OF CACAO OR PEPPER DISEASES
198           CALL CDISEA
199           LOT = 1
200     C     MAINTENANCE OF CACAO AND PEPPER
201           CALL SQMNT(LOT)
202     C     INITIALIZATION OF LOT USE COUNTER FOR 12 LAND USES MONITORED IN
203     C     LAND USE OUTPUT
204           DO 351 LUCOUN = 1,12
205       351 LOTUSE(LUCOUN) = 0
206           DO 104 IPCH = 1, NOPCHS
207           BUTYP(LOT, IPCH) = 0
208           BUQUAL(LOT, IPCH) = 0
209     C     SAVING PREVIOUS LAND USE FOR USE IN USETOT
210           IPVLU = LUSE(LOT, IPCH)
211           IF (IYR .GT. 2) GO TO 605
212     C     PASTURE CACAO AND PEPPER (VIRGIN BURN)
213           IF (IPCH .GT. NPCHAC) GO TO 606
214     C     ANNUAL CROPS (VIRGIN BURN)
215           GO TO 601
216       605 IF (LUSE(1, IPCH) .GE. 20) GO TO 804
217     C       PASTURE, CACAO, AND PEPPER NOT RE-ALLOCATED AFTER CROP DEATH
218           IF (IPCH .GT. NPCHAC .AND. IYR .GE. 3) GO TO 804
219           IF (ICULT .EQ. 1) GO TO 600
220           IF (IPCH .EQ. 1) IYFAL = IYFAL + 1
221           IF (IYFAL .GT. IFALYR) GO TO 601
222           GO TO 804
223       801 CONTINUE
224     C     BEGINNING OF FALLOW PERIOD
225           CONTIN(LOT, IPCH) = 0.
226           LUSE(LOT, IPCH) = 4
227           ICULT = 2
228           IYCUL = 0
229           IYFAL = 1
230           GO TO 804
231     C     BEGINNING OF FARMED PERIOD
232       601 ICULT = 1
233           IYFAL = 0
234       600 IF (IPCH .EQ. 1) IYCUL = IYCUL + 1
235           IF (IYCUL .GT. IFARYR) GO TO 801
236           IF (IYCUL .GE. 2) GO TO 804
237     C     DETERMINATION OF WHETHER A PATCH IS BURNED AND
238     C       BURN QUALITY DETERMINATION
239       606 XRAN = ARAND(INIT, -1.)
240           IF (LASTUS(LOT, IPCH) .EQ.1 .AND. XRAN .LT. BURNPR(1))
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241           1   CALL VBQ(LOT, IPCH)
242            IF (LASTUS(LOT, IPCH) .EQ. 6 .AND. XRAN .LT. BURNPR(2))
243           1 CALL SGBQ(LOT, IPCH)
244            IF (LASTUS(LOT, IPCH) .GE. 4 .OR. LASTUS(LOT, IPCH) .EQ. 1)
245           1 GO TO 901
246      C     FOR REED BURNS
247            IF (XRAN .LT. BURNPR(3)) BUTYP(LOT, IPCH) = 3
248         901 CONTINUE
249      C     LAND USE ALLOCATION
250      C     ANNUAL CROPS ASSIGNED AS RICE ALONE
251            IF (IPCH .LE. NPCHAC) LUSE(1, IPCH) = 5
252      C     PASTURE WITH ANIMALS
253            IF (IPCH .GT. NPCHAC .AND. IPCH .LE. (NPCHAC +
254           1 NPCHPA)) LUSE(1, IPCH) = 23
255      C     CACAO
256            IF (IPCH .GT. (NPCHAC+NPCHPA) .AND. IPCH .LE. (NPCHAC +
257           1 NPCHPA + NPCHCA) .AND. IWBROO(1, IPCH) .LT. IYR) LUSE(1,IPCH)=20
258      C     PEPPER
259            IF (IPCH .GT. (NPCHAC+NPCHPA+NPCHCA)
260           1 .AND. IFUSAR(1, IPCH) .LT. IYR) LUSE(1,IPCH)=21
261         804 CONTINUE
262      C     BARE TO SECOND GROWTH TRANSITION
263            IF (LUSE(1, IPCH) .EQ. 2) LUSE(1, IPCH) = 4
264            CALL USETOT(1, IPCH, IPVLU, IPCH)
265      C     EROSION CALCULATION
266            CALL EROSN(LOT, IPCH)
267      C     SOIL CHANGE
268            CALL SQSCH(LOT, IPCH)
269      C     YIELD CALCULATIONS AND LOT PRODUCTION
270            CALL SOILLP(LOT, IPCH)
271         104 CONTINUE
272         800 CONTINUE
273      C     LAND USE OUTPUT CALCULATIONS FROM TOTALS SUMMED IN LOTPRO
274            DO 353 ILU = 1,12
274.2    C      MISSING YIELDS SET AT -99.
274.4           IF (USEOUT(1, ILU) .LE. 0.01) USEOUT(3, ILU) = -99.
275      C     AVERAGE YIELD SET AT -99. FOR ANNUAL CROPS DURING FALLOW PERIODS
276            IF (ILU .LE. 8 .AND. ICULT .EQ. 2) USEOUT(3, ILU) = -99.
277           1  * AMAX1(1., USEOUT(1, ILU))
278            IF (USEOUT(1, ILU) .LE. 0.01) GO TO 354
279      C     AREA-WIDE AVERAGE YIELD FOR EACH LAND USE
280      C     (IN THE CASE OF MANIOC THIS REPRESENTS THE YIELD
281      C     PER HECTARE PER YEAR GROWTH FOR THE PATCHES HARVESTED ONLY)
282            USEOUT(3, ILU) = USEOUT(3, ILU) / USEOUT(1, ILU)
283      C     PROPORTION OF STUDY AREA IN EACH LAND USE
284      C     (IN THE CASE OF MANIOC THIS REPRESENTS THE PROPORTION
285      C     OF AREA WHICH IS HARVESTED MANIOC)
286         354 USEOUT(1, ILU) = USEOUT(1, ILU) / FLOAT(LOTS * NOPCHS)
287      C     PROPORTION OF LOTS WITH LAND USE (IN THE CASE OF MANIOC THIS REPRESENTS THE
288      C     HARVESTED AREA)
289         353 USEOUT(2, ILU) = USEOUT(2, ILU) / FLOAT(LOTS)
290      C     OUTPUT OF LAND USE AREA-WIDE MEASURES
291            DO 355 LUOCR = 1,3
292            LUCBEG = LUOCR * 4 - 3
293            LUCEND = LUOCR * 4
294         355 WRITE (15, 3036) NORUN, IYR, ((USEOUT(LUOIT, LUC), LUOIT=1,3),
295           1 LUC=LUCBEG, LUCEND)
296        3036 FORMAT(I3, I5, 4(2F6.3, F6.0))
297      C     ABOVE FORMAT 3036 FOR FILE OUTPUTFILE 3 (LAND USE MEASURES LIST)
298      C     SOIL QUALITY OUTPUT
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   299            CALL SSQOUT(NORUN, NPCHAC, NPCHPA, NPCHCA)
   300        102 CONTINUE
   301        201 CONTINUE
   302            RETURN
   303            END
END OF FILE
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      1            FUNCTION ARAND(INIT, RMODE)
      2      C     UNIFORMLY DISTRIBUTED RANDOM NUMBER BETWEEN 0 AND 1
      3      C     FOR DETERMINISTIC RUNS AN APPROPRIATE SUBSTITUTE IS
      4      C     RETURNED:  A VALUE OF 0.5 (FOR THE MEDIAN) FOR NON-NORMAL
      5      C     PROBABILITY DISTRIBUTIONS, AND THE MOST COMMON CHOICE (MODE)
      6      C     FOR PROBABILISTICALLY DETERMINED BRANCHES
      7            COMMON/DETERM/ ISTOCH
      8            IF (ISTOCH .EQ. 2) GO TO 800
      9            IF (RMODE .GE. 0.) GO TO 100
     10            ARAND = 0.5
     11            GO TO 900
     12        100 ARAND = RMODE
     13            GO TO 900
     14        800 ARAND = URAND(INIT)
     15        900 CONTINUE
     16            RETURN
     17            END
END OF FILE
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      BLOCK DATA
C     MONTHLY WEATHER STANDARD DEVIATIONS
      COMMON/MOWEA/ SDRAIN(12), SDEVAP(12), SDINSO(12)
      DATA SDRAIN(1), SDRAIN(2), SDRAIN(3), SDRAIN(4), SDRAIN(5),
     1 SDRAIN(6), SDRAIN(7), SDRAIN(8), SDRAIN(9), SDRAIN(10),
     2 SDRAIN(11), SDRAIN(12)
     1 / 0.0485, 0.0490, 0.0412, 0.0478,
     1 0.0696, 0.0648, 0.0843, 0.1096, 0.0969, 0.1013, 0.1346, 0.0677/
      DATA SDEVAP(1), SDEVAP(2), SDEVAP(3), SDEVAP(4), SDEVAP(5),
     1 SDEVAP(6), SDEVAP(7), SDEVAP(8), SDEVAP(9), SDEVAP(10),
     2 SDEVAP(11), SDEVAP(12)
     1 / 0.0219, 0.0176, 0.0123, 0.0270,
     1 0.0258, 0.0302, 0.0342, 0.0267, 0.0289, 0.0250, 0.0150, 0.0302 /
      DATA SDINSO(1), SDINSO(2), SDINSO(3), SDINSO(4), SDINSO(5),
     1 SDINSO(6), SDINSO(7), SDINSO(8), SDINSO(9), SDINSO(10),
     2 SDINSO(11), SDINSO(12)
     1 / 0.0243, 0.0307, 0.0261,
     1 0.0289, 0.0667, 0.0313, 0.0162, 0.0108, 0.0136, 0.0231, 0.0263,
     2 0.0336/
      END
END OF FILE
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      SUBROUTINE BMYLD(LOT, IPCH)
C     BITTER MANIOC YIELD SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE,
     1 PHADJ, PRYLME, PRYL, GTHMUL, GTHPER
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/TECHN/TECH(9), START(9)
      COMMON/YIELDS/ YLDBI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     1 YLDCA, YLDPA
      EXTERNAL BRAND
C     FOLLOWING PREVENTS COUNTING MANIOC HARVEST MORE THAN
C     ONCE.  HARVEST IS ONLY COUNTED FOR THE FIRST YEAR.
C     NEGATIVE YIELD INDICATES TO LOTPRO SUBROUTINE THAT
C     YIELD IS NOT TO BE COUNTED.
      YLDBM = -1.0
      IF (IDUR(LOT, IPCH) .GE. 365) GO TO 900
C     INITIALIZATION OF GROWTH PERIOD MULTIPLIER
      GTHMUL = 1.0
C     GROWTH PERIOD ASSIGNMENT (DAYS)
      GTHPER = BRAND(1.93D2, 4.72D2)
      IF (GTHPER .LE. 0.) GTHPER = 0.
C     PH ADJUSTMENT FOR RESPONSE PLATEAU
      PHADJ = 5.0
      IF (PH(LOT, IPCH) .LE. PHADJ) PHADJ = PH(LOT, IPCH)
C     CALCULATION OF GROWTH PERIOD MULTIPLIER
      IF (GTHPER .LT. 365.) GTHMUL = BRAND(4.0D-1, 3.18D0)
      IF (GTHPER .GT. 730.) GTHMUL = BRAND(0.37, 0.40)
      IF (GTHMUL .LE. 0.) GTHMUL = 0.
C     CALCULATION OF REGRESSION PREDICTED YIELD (KG FARINHA/HA/12 MONTHS
C     GROWTH)
      PRYLME = 4124.4 * PHADJ - 17369.
      PRYL = BRAND(4.14D2, PRYLME)
      IF (PRYL .LE. 0.) PRYL = 0.
C     BITTER MANIOC YIELD CALCULATION (KG FARINHA / HA)
      YLDBM = PRYL * GTHPER / 365. * GTHMUL
C     ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
      YLDBM = YLDBM * TECH(5)
      IF (YLDBM .LE. 0.0) YLDBM = 0.0
  900 CONTINUE
      RETURN
      END
END OF FILE
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      1            DOUBLE PRECISION FUNCTION BRAND(SDEV, RMEAN)
      2      C     NORMALLY DISTRIBUTED RANDOM NUMBER FROM THE
      3      C      DISTRIBUTION WITH THE GIVEN MEAN AND STANDARD DEVIATION
      4      C    FOR DETERMINISTIC RUNS THE MEAN IS RETURNED.
      5            DOUBLE PRECISION SDEV, RMEAN
      6            COMMON/DETERM/ ISTOCH
      7            COMMON/RANDOM/ INIT
      8            IF (ISTOCH .EQ. 1) GO TO 100
      9            CALL GRAND1(INIT)
     10            BRAND = GRAND(SDEV, RMEAN)
     11            GO TO 900
     12        100 BRAND = RMEAN
     13        900 CONTINUE
     14            RETURN
     15            END
END OF FILE
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```
      1            SUBROUTINE CAYLD(LOT, IPCH)
      2      C     CACAO YIELD SUBROUTINE
      3            DOUBLE PRECISION BRAND
      4            DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, PHADJ, SLOPE
      5            COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
      6           1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      7            COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
      8           1 CONTIN(1, 9)
      9            COMMON/DATE/ IYR
     10            COMMON/TECHN/ TECH(9), START(9)
     11            COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     12           1 YLDCA, YLDPA
     13            COMMON/DISEA/ PINFEC(3, 2), LSPORE(3), IBPOD(1, 9),
     14           1 IWBROO(1, 9), IFUSAR(1, 9), IWBEST, IFUEST, IBPEST, BPMULT,
     15           2 WBMULT, FUMULT, PWDIES(3)
     16            EXTERNAL BRAND
     17      C     ADJUSTMENT FOR RESPONSE PLATEAU AT CACAO CRITICAL PH (CACRPH)
     18      C     FOLLOWING FOR DEATH OF CACAO EXCEEDING
     19      C     LIFE EXPECTANCY OF 90 YEARS (32873 DAYS)
     20            YLDCA = 0.
     21            IF (IDUR(LOT, IPCH) .LT. 32873) GO TO 101
     22            LUSE (LOT, IPCH) = 2
     23            IDUR(LOT, IPCH) = 0
     24            GO TO 900
     25          101 CONTINUE
     26            CACRPH = 7.5
     27            PHADJ = PH(LOT, IPCH)
     28            IF (PHADJ .GE. CACRPH) PHADJ = CACRPH
     29      C     CACAO YIELD FROM SOIL MEAN
     30            CYFSME = 193.21 * PHADJ - 744.29
     31      C     CACAO YIELD FROM SOIL
     32            CAYFS = SNGL(BRAND(1.2374D2, DBLE(CYFSME)))
     33      C     ADJUSTMENT FOR SCALING BRAZIL MAXIMUM CACAO YIELDS (CACMAX) AND
     34      C     REGRESSION PREDICTED CACAO YIELD FROM SOIL BASED ON TRINIDAD DATA
     35            CAYFS = CAYFS *START(7)/ 710.
     36      C     CACAO YEAR EFFECT (FOR FIELDS LESS THAN 5 YRS OLD)
     37            CAYREF = 1.
     38            IF (IDUR(LOT, IPCH) .GE. 1826) GO TO 100
     39            CAYREF = 0.750
     40            IF (IDUR(LOT, IPCH) .LT. 1461) CAYREF = 0.375
     41            IF (IDUR(LOT, IPCH) .LT. 1096) CAYREF = 0.125
     42            IF (IDUR(LOT, IPCH) .LT. 730)  CAYREF = 0.
     43          100 CONTINUE
     44      C     BLACK POD DISEASE EFFECT
     45            BPEFF = 1.
     46            IF (IBPOD(LOT, IPCH) .EQ. IYR) BPEFF = BPMULT
     47      C     WITCHES BROOM EFFECT
     48            WBEFF = 1.
     49            IF (IWBROO(LOT, IPCH) .EQ. IYR) WBEFF = WBMULT
     50      C     CALCULATE CACAO YIELD (KG DRY SEEDS / HA)
     51            YLDCA = CAYFS * CAYREF  * BPEFF * WBEFF
     52      C     ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
     53            YLDCA = YLDCA * TECH(7)
     54            IF (YLDCA .LE. 0.) YLDCA = 0.
     55          900 CONTINUE
     56            RETURN
     57            END
END OF FILE
```

```
      1            SUBROUTINE CBUEFF(LOT, IPCH)
      2      C     SECOND GROWTH BURN EFFECTS SUBROUTINE
      3            INTEGER BUQUAL, BUTYP
      4            DOUBLE PRECISION BRAND
      5            DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE, PHCH,
      6           1 ALCH, PCH, RNCH, UBPHCH, UBALCH, UBPCH, UBNCH, PHCHME, RNCHME,
      7           2  ALCHME, PHBEFF, ALBEFF, CBEFF, RNBEFF, PBEFF, CBQDUM
      8            COMMON/BURNS/ BUTYP(1, 9), BUQUAL(1, 9)
      9            COMMON/BUCHNG/ PHCH, ALCH, PCH, RNCH
     10            COMMON/UBCHNG/ UBPHCH, UBALCH, UBPCH, UBNCH
     11            COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     12           1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
     13            COMMON/RANDOM/ INIT
     14            COMMON/BEFORE/ PHBEFF, ALBEFF, CBEFF, RNBEFF, PBEFF
     15            COMMON/UTCOM/ LUMAXA(1, 9), DAYSBA(1, 9), DAYSAC(1,9),
     16           1 DAYSTC(1, 9), DAYSPA(1, 9), DAYSFA(1, 9), RAINBA(1,
     17           2 9),RAINAL(1, 9)
     18            EXTERNAL RAND, BRAND
     19      C     SECOND GROWTH BURN QUALITY DUMMY VARIABLE ASSIGNMENT
     20            CBQDUM = -1.
     21            IF (BUQUAL(LOT, IPCH) .LE. 1) CBQDUM = 1.
     22      C     PHOSPHORUS CHANGE CALCULATION
     23            PCHME = 0.741 * UBPCH - 0.831 * CBQDUM - 1.52
     24            PCH = BRAND(2.62D0, PCHME)
     25      C     ALUMINUM CHANGE CALCULATION
     26            IF (ALBEFF .GT. 0.001) GO TO 100
     27      C     FOR BEFORE FIELD ALUMINUM = 0.
     28            XRAN = RAND(INIT, -1.)
     29            IF (XRAN .LT. 0.70) ALCH = 0.
     30            IF (XRAN .GE. 0.70 .AND. XRAN .LT. 0.90) ALCH = 0.1
     31            IF (XRAN .GE. 0.90 .AND. XRAN .LT. 0.95) ALCH = 0.2
     32            IF (XRAN .GE. 0.95) ALCH = 0.4
     33            GO TO 101
     34          100 CONTINUE
     35      C     FOR BEFORE FIELD ALUMINUM GREATER THAN 0.
     36            ALCHME = 0.166 - 0.267 * ALBEFF
     37            ALCH = BRAND(1.53D0, ALCHME)
     38          101 CONTINUE
     39      C     PH CHANGE CALCULATION
     40            PHCHME = 3.4817D0 - 2.2603D-1 * ALBEFF - 2.3129D-1 * ALCH -
     41           1 3.37D-4 * DAYSAC(LOT, IPCH)  - 5.1758D-1 * PHBEFF
     42            PHCH = BRAND(6.46D-1, PHCHME)
     43      C     CALCULATION OF NITROGEN CHANGE
     44            BUNEF = BRAND(5.8D-2, -3.3D-2)
     45            RNCH = BUNEF + UBNCH
     46            RETURN
     47            END
END OF FILE
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```
      SUBROUTINE CDISEA
C     CROP DISEASE SUBROUTINE (FOR PERENNIAL CROPS)
      COMMON/DATE/ IYR
      COMMON/SIZES/ LOTS, NOPCHS, SIZLOT, SIZPCH
      COMMON/RANDOM/ INIT
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1CONTIN(1, 9)
      COMMON/DISEA/ PINFEC(3, 2), LSPORE(3), IBPOD(1, 9),
     1 IWBROO(1, 9), IFUSAR(1, 9), IWDEST, IFUEST, IBPEST,
     1 BPMULT, WBMULT, FUMULT, PRDIES(3)
      EXTERNAL ARAND
      DO 100 LO = 1, LOTS
      DO 101 IP = 1, NOPCHS
      IDIS = 0
C     BLACK POD
      IF (IBPOD(LO, IP) .EQ. 0) GO TO 105
      IBPEST = 2
C     YEARS SINCE DISEASE
      IYRSSD = IYR - IBPOD(LO, IP)
      IF (IYRSSD .GT. LSPORE(3)) GO TO 400
      IF (LUSE(LO, IP) .EQ. 20) IBPOD(LO, IP) = IYR
  105 CONTINUE
C     WITCHES BROOM
      IF (IWBROO(LO, IP) .EQ. 0) GO TO 103
C     YEARS SINCE DISEASE
      IWBEST = 2
      IYRSSD = IYR - IWBROO(LO, IP)
      IF (IYRSSD .GT. LSPORE(2)) GO TO 401
      IF (LUSE(LO, IP) .EQ. 20) IWBROO(LO, IP) = IYR
  103 CONTINUE
C     FUSARIUM
      IF (IFUSAR(LO, IP) .EQ. 0) GO TO 402
      IFUEST = 2
C     YEARS SINCE DISEASE
      IYRSSD = IYR - IFUSAR(LO, IP)
      IF (IYRSSD .GT. LSPORE(1)) GO TO 403
      IF (LUSE(LO, IP) .EQ. 21) IFUSAR(LO, IP) = IYR
      IDIS = 1
      GO TO 402
  400 IBPOD(LO, IP) = 0
      IBPEST = 1
      GO TO 105
  402 CONTINUE
      IF (LUSE(LO, IP) .EQ. 20) GO TO 104
      IF (LUSE(LO, IP) .EQ. 21) GO TO 304
      GO TO 101
  104 CONTINUE
C     BLACK POD DECISION
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. PINFEC(3, IBPEST)) IBPOD(LO, IP) = IYR
      IF (IBPOD(LO, IP) .LT. IYR) GO TO 204
C     DETERMINATION OF CROP DEATH
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .GE. PRDIES(3)) GO TO 204
      LUSE(LO, IP) = 2
      IDUR(LO, IP) = 0
      GO TO 101
  401 IWBROO(LO, IP) = 0
      IWBEST = 1
      GO TO 103
```

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     61        204 CONTINUE
     62      C     WITCHES BROOM DECISION
     63            XRAN = ARAND(INIT, -1.)
     64            IF (XRAN .LT. PINFEC(2, IWBEST)) IWBROO(LO, IP) = IYR
     65            IDIS = 2
     66            IF (IWBROO(LO, IP) .EQ. IYR) GO TO 200
     67            GO TO 101
     68        403 IFUSAR(LO, IP) = 0
     69            IFUEST = 1
     70            GO TO 402
     71        304 CONTINUE
     72      C     PATCHES IN PEPPER
     73      C     FUSARIUM DECISION
     74            XRAN = ARAND(INIT, -1.)
     75            IF (XRAN .LT. PINFEC(1, IFUEST)) IFUSAR(LO, IP) = IYR
     76            IDIS = 1
     77            IF (IFUSAR(LO, IP) .LT. IYR) GO TO 101
     78        200 XRAN = ARAND(INIT, -1.)
     79      C     DETERMINATION OF CROP DEATH
     80            IF (XRAN .GE. PRDIES(IDIS)) GO TO 101
     81            LUSE(LO, IP) = 2
     82            IDUR(LO, IP) = 0
     83        101 CONTINUE
     84        100 CONTINUE
     85            RETURN
     86            END
END OF FILE
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```
      SUBROUTINE EROSN(LOT, IPCH)
C     EROSION SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY,
     1 SLOPE
      COMMON/EROCOM/ EROS
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9), NITRO(1,
     1 9), CARB(1, 9), CLAY(1, 9), SLOPE(1,9)
      COMMON/UTCOM/ LUMAXR(1, 9), DAYSBA(1, 9), DAYSAC(1, 9),
     1 DAYSTC(1, 9), DAYSPA(1, 9), DAYSFA(1, 9), RAINBA(1,
     2 9), RAINAC(1, 9)
      EXTERNAL BRAND
      IF (LUMAXR(LOT, IPCH) .EQ. 2) GO TO 100
      GO TO 101
  100 CONTINUE
C     EROSION CALCULATION FOR LAND USE ANNUAL CROPS OR BARE AT TIME OF
C     MAXIMUM RAINFALL IN 24 HOURS
      EROME = 0.164 * SLOPE(LOT, IPCH) + 1.88D-3 * RAINBA(LOT,IPCH)
     1 + 1.46
      EROS = SNGL(BRAND(2.13D0, DBLE(EROME)))
      GO TO 200
  101 CONTINUE
C     EROSION CALCULATION FOR LAND USE VIRGIN, SECOND GROWTH, WEEDS,
C     PASTURE, CACAO OR PEPPER AT TIME OF MAXIMUM RAINFALL
      PLERTO = 0.
      DO 103 I1 = 1, 15
C     DOES ONE ITERATION FOR EACH "STAKE" IN THE HYPOTHETICAL "EROSION
C     PLOT"
      STSLME = 0.462 * SLOPE(LOT, IPCH) + 3.13
      STSLOP = SNGL(BRAND(4.94D0, DBLE(STSLME)))
      IF (STSLOP .LE. 0.) STSLOP = 0.
      IF (LUMAXR(LOT, IPCH) .EQ. 3) GO TO 104
      IF (LUMAXR(LOT, IPCH) .EQ. 4) GO TO 105
      IF (LUMAXR(LOT, IPCH) .EQ. 5) GO TO 106
      IF (LUMAXR(LOT, IPCH) .EQ. 6) GO TO 107
      IF (LUMAXR(LOT, IPCH) .EQ. 1) GO TO 108
      IF (LUMAXR(LOT, IPCH) .EQ. 7) GO TO 109
      WRITE (6, 1000) LUMAXR(LOT, IPCH)
 1000 FORMAT(1X, 'ERROR: LAND USE AT MAX. RAIN', I5, 2X,
     1 'NOT RECOGNIZED IN EROSION SUBROUTINE')
      CALL SYSTEM
  104 CONTINUE
C     EROSION CALCULATION FOR BLACK PEPPER AT TIME OF MAX. RAIN
      STERME = 0.712 * STSLOP + 6.05
      STEROS = SNGL(BRAND(6.10D0, DBLE(STERME)))
      GO TO 102
  105 CONTINUE
C     EROSION CALCULATION FOR CACAO AT TIME OF MAX. RAIN
      STEROS = SNGL(BRAND(8.3D0, 1.00D1))
      GO TO 102
  106 CONTINUE
C     EROSION CALCULATION FOR PASTURE AT TIME OF MAX. RAIN
      STEROS = SNGL(BRAND(1.18D1, 6.7D0))
      GO TO 102
  107 CONTINUE
C     EROSION CALCULATION FOR WEEDS AT TIME OF MAX. RAIN
      STEROS = SNGL(BRAND(5.4D0, 8.1D0))
      GO TO 102
  108 CONTINUE
C     EROSION CALCULATION FOR VIRGIN AT TIME OF MAX. RAIN
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     61              STEROS = SNGL(BRAND(5.1D0, 7.5D0))
     62              GO TO 102
     63          109 CONTINUE
     64      C       EROSION CALCULATION FOR SECOND GROWTH AT TIME OF MAX. RAIN
     65              STEROS = SNGL(BRAND(8.7D0, 6.9D0))
     66          102 CONTINUE
     67      C       CALCULATION OF "PLOT" EROSION
     68              PLERTO = PLERTO + STEROS
     69          103 CONTINUE
     70              EROS = PLERTO / 15.
     71          200 CONTINUE
     72              RETURN
     73              END
END OF FILE
```

```
      1            FUNCTION IDAGYR(IDOM, ICALMO)
      2      C     DAY OF AGRICULTURAL YEAR FUNCTION: RETURNS DAY OF AGRIC. YR. GIVEN
      3      C     DAY OF MONTH AND CALENDAR MONTH
      4            COMMON/DATE/ IYR
      5            EXTERNAL IDAYYR
      6            IAGMO = ICALMO - 6
      7            IF (ICALMO .GE. 7) GO TO 200
      8            IAGMO = ICALMO + 6
      9        200 IDAGYR = IDAYYR(IDOM, IAGMO, IYR)
     10            RETURN
     11            END
END OF FILE
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      1            FUNCTION IDAYYR(IDOM, IAGRMO, IAGRYR)
      2      C     DAY OF YEAR FUNCTION WHICH RETURNS THE DAY OF THE AGRICULTURAL
      3      C     YEAR (JULY 1 - JUNE 30) GIVEN THE DAY OF THE MONTH, AGRICULTURAL
      4      C     MONTH (JULY = 1) AND AGRICULTURAL YEAR.
      5      C
      6      C     CALCULATION OF CALENDAR MONTH
      7            EXTERNAL NDAYS
      8            ICALMO = IAGRMO - 6
      9            IF (IAGRMO .LT. 7) ICALMO = IAGRMO + 6
     10      C     CALCULATION OF PRESENT CALENDAR YEAR
     11            ICYPRE = IAGRYR
     12            IF (IAGRMO .GT. 6) ICYPRE = IAGRYR + 1
     13            IDAYYR = NDAYS(IDOM, ICALMO, ICYPRE) - NDAYS(1, 7, IAGRYR)
     14            RETURN
     15            END
     16            FUNCTION NDAYS(IDA, ICALMO, ICALYR)
     17      C     NUMBER OF DAYS FUNCTION WHICH RETURNS THE NUMBER OF ELAPSED
     18      C     DAYS SINCE CALENDAR DAY=1, MONTH=1 AND YEAR=1 (JAN-DEC CALENDAR)
     19            K1 = 365 * ICALYR + ICALYR / 4
     20            C = 30.6 * FLOAT(ICALMO) - 32.3
     21            IF (ICALMO .GE. 3) GO TO 5
     22            IF (MOD(ICALYR, 4) .EQ. 0) K1 = K1 - 1
     23            C = C + 2.3
     24          5 NDAYS =  K1 + INT(C) + IDA  - 365
     25            RETURN
     26            END
END OF FILE
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```
      SUBROUTINE INITSQ(LOT, IPCH)
      REAL*8 DLOG
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9), NITRO(1,
     1 9), CARB(1, 9), CLAY(1, 9), SLOPE(1,9)
      COMMON/HISTOR/ VIRGSO(1, 9)
      COMMON/MATRIX/ PROB(7, 7, 2)
      COMMON/RANDOM/ INIT
      EXTERNAL ARAND, BRAND
C     INITIALIZATION OF VIRGIN SOIL INDICATIOR (FOR PHASEOLUS DISEASE
C     PROBABILITY CALCULATION)
      VIRGSO(LOT, IPCH) = 1
      IF (LOT .EQ. 1 .AND. IPCH .EQ. 1) GO TO 101
C     FOLLOWING FOR CALLS NOT THE FIRST CALL FOR RUN
      IDIST = 1
C     DISTANCE MOVED OF 100 METERS CODED 1 ; 500 METERS CODED 2
      IF (IPCH  .EQ. 1) IDIST = 2
C     ASSIGNMENT OF PREVIOUS PATCH AND LOT
      IPVP = IPCH - 1
      IPVL = LOT
      IF (IPCH .GE. 2) GO TO 300
      IPVL = LOT - 1
      IPVP = 1
  300 CONTINUE
C     ASSIGNMENT OF PH CLASS
      IF (PH(IPVL, IPVP) .LT. 4.) IPHCL = 1
      IF (PH(IPVL, IPVP) .GE. 4. .AND. PH(IPVL,IPVP).LT.4.5) IPHCL=2
      IF (PH(IPVL, IPVP) .GE.4.5 .AND. PH(IPVL,IPVP).LT.5.0) IPHCL=3
      IF (PH(IPVL, IPVP) .GE.5.0 .AND. PH(IPVL,IPVP).LT.5.5) IPHCL=4
      IF (PH(IPVL, IPVP) .GE.5.5 .AND. PH(IPVL,IPVP).LT.6.0) IPHCL=5
      IF (PH(IPVL, IPVP) .GE.6.0 .AND. PH(IPVL,IPVP).LT.6.5) IPHCL=6
      IF (PH(IPVL, IPVP) .GE. 6.5) IPHCL = 7
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. PROB(1, IPHCL, IDIST)) GO TO 11
      P2 = PROB(1, IPHCL, IDIST) + PROB(2, IPHCL, IDIST)
      IF (XRAN .GE. PROB(1, IPHCL, IDIST) .AND. XRAN .LT. P2) GO TO 12
      P3 = P2 + PROB(3, IPHCL, IDIST)
      P4 = P3 + PROB(4, IPHCL, IDIST)
      P5 = P4 + PROB(5, IPHCL, IDIST)
      P6 = P5 + PROB(6, IPHCL, IDIST)
      IF (XRAN .GE. P2 .AND. XRAN .LT. P3) GO TO 13
      IF (XRAN .GE. P3 .AND. XRAN .LT. P4) GO TO 14
      IF (XRAN .GE. P4 .AND. XRAN .LT. P5) GO TO 15
      IF (XRAN .GE. P5 .AND. XRAN .LT. P6) GO TO 16
      GO TO 17
  101 CONTINUE
C     FOLLOWING FOR CASE OF FIRST CALL OF RUN
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.330) GO TO 11
      IF (XRAN .LT. 0.632) GO TO 12
      IF (XRAN .LT. 0.785) GO TO 13
      IF (XRAN .LT. 0.910) GO TO 14
      IF (XRAN .LT. 0.963) GO TO 15
      IF (XRAN .LT. 0.999) GO TO 16
      GO TO 17
   11 CONTINUE
C     FOR PH CLASS 1 (PH < 4.0)
      PH(LOT, IPCH) = BRAND(1.0D-1, 3.7D0)
      GO TO 102
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      12 CONTINUE
C        FOR PH CLASS 2 (PH 4.0 - 4.4)
         PH(LOT, IPCH) = BRAND(1.0D-1, 4.1D0)
         GO TO 102
      13 CONTINUE
C        FOR PH CLASS 3 (4.5 - 4.9)
         PH(LOT, IPCH) = BRAND(1.0D-1, 4.7D0)
         GO TO 102
      14 CONTINUE
C        FOR PH CLASS 4 ( PH 5.0 - 5.4)
         PH(LOT, IPCH) = BRAND(1.0D-1, 5.2D0)
         GO TO 102
      15 CONTINUE
C        FOR PH CLASS 5  (PH 5.5 - 5.9)
         PH(LOT, IPCH) = BRAND(1.0D-1, 5.6D0)
         GO TO 102
      16 CONTINUE
C        FOR PH CLASS 6  (PH 6.0 - 6.4)
         PH(LOT, IPCH) = BRAND(1.0D-1, 6.3D0)
         GO TO 102
      17 CONTINUE
C        FOR PH CLASS 7 (PH 6.5 UP)
         PH(LOT, IPCH) = 7.1
     102 CONTINUE
C        CLAY ASSIGNMENT
         XRAN = ARAND(INIT, -1.)
         IF (XRAN .LT. 0.216) CLAY(LOT, IPCH)=BRAND(2.83D0, 9.71D0)
         IF (XRAN .GE. 0.216.AND.XRAN.LT.0.469)CLAY(LOT,IPCH)=BRAND(4.05D0,
        1 2.17D1)
         IF(XRAN.GE.0.469.AND.XRAN.LT. 0.705) CLAY(LOT, IPCH) =
        1 BRAND(4.48D0, 3.795D1)
         IF (XRAN .GE. 0.705 .AND. XRAN .LT. 0.917) CLAY(LOT, IPCH) =
        1 BRAND(4.00D0, 5.00D1)
         IF (XRAN .GE. 0.917 .AND. XRAN .LT. 0.992) CLAY(LOT, IPCH) =
        1 BRAND(3.57D0, 6.972D1)
         IF (XRAN .GE. 0.992) CLAY(LOT, IPCH) = BRAND(1.03D0, 7.88D1)
C        SLOPE ASSIGNMENT
         XRAN = ARAND(INIT, -1.)
         IF (XRAN .LT. 0.320) SLOPE(LOT, IPCH) = BRAND(1.4D0, 2.0D0)
         IF (XRAN .GE. 0.320 .AND. XRAN .LT. 0.507) SLOPE(LOT, IPCH) =
        1 BRAND(1.3D0, 6.3D0)
         IF (XRAN .GE. 0.507 .AND. XRAN .LT. 0.800) SLOPE(LOT, IPCH) =
        1 BRAND(2.5D0, 1.38D1)
         IF (XRAN .GE. 0.800 .AND. XRAN .LT. 0.935) SLOPE(LOT, IPCH) =
        1 BRAND(2.2D0, 2.28D1)
         IF (XRAN .GE. 0.935 .AND. XRAN .LT. 0.993) SLOPE(LOT, IPCH) =
        1 BRAND(2.9D0, 3.78D1)
         IF (XRAN .GE. 0.993 .AND. XRAN .LT. 0.999) SLOPE(LOT, IPCH) =
        1 BRAND(3.3D0, 5.79D1)
         IF (XRAN .GE. 0.999) SLOPE(LOT, IPCH) = 89.0
         IF (SLOPE(LOT, IPCH) .LE. 0.) SLOPE(LOT, IPCH) = 0.
C        ALUMINUM ASSIGNMENT
         ALMEAN = 11.43 - 7.68 * DLOG(PH(LOT, IPCH)) - 6.27D-2 * CLAY(LOT,
        1 IPCH)
         AL(LOT, IPCH) = BRAND(1.56D0, DBLE(ALMEAN))
C        CARBON ASSIGNMENT
         XRAN = ARAND(INIT, -1.)
         IF (XRAN .LT. 0.019) CARB(LOT, IPCH) = BRAND(8.0D-2, 3.9D-1)
         IF (XRAN .GE.0.019.AND.XRAN.LT.0.329)CARB(LOT,IPCH)=
        1 BRAND(1.1D-1, 7.0D-1)
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      IF(XRAN.GE.0.329.AND.XRAN.LT.0.380)CARB(LOT,IPCH)=
     1 BRAND(3.0D-2, 9.4D-1)
      IF(XRAN.GE.0.380.AND.XRAN.LT.0.788)CARB(LOT,IPCH)=
     1 BRAND(1.3D-1, 1.18D0)
      IF(XRAN.GE.0.788) CARB(LOT, IPCH) = BRAND(1.4D-1, 1.70D0)
C     PHOSPHORUS ASSIGMNENT
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.838) PHOS(LOT, IPCH) = 1.0
      IF(XRAN.GE.0.838.AND.XRAN.LT.0.921)PHOS(LOT,IPCH)=2.0
      IF(XRAN.GE.0.921.AND.XRAN.LT.0.978)PHOS(LOT,IPCH)=
     1 BRAND(1.0D-1, 3.0D0)
      IF(XRAN.GE.0.976.AND.XRAN.LT.0.999)PHOS(LOT,IPCH)=
     1 BRAND(4.0D-1, 5.2D0)
      IF(XRAN.GE.0.999) PHOS(LOT, IPCH) = 7.0
C     NITROGEN ASSIGNMENT
      RNITME = 0.132 * CARB(LOT, IPCH) + 2.20D-2 * PH(LOT, IPCH) - 0.120
      NITRO(LOT, IPCH) = BRAND(3.0D-2, DBLE(RNITME))
      IF (PH(LOT,IPCH).LT. 1.) PH(LOT, IPCH) = 1.
      IF (AL(LOT,IPCH).LT. 0.) AL(LOT, IPCH) = 0.
      IF (PHOS(LOT, IPCH) .LT. 0.1) PHOS(LOT, IPCH) = 0.1
      IF (NITRO(LOT,IPCH) .LT. 0.0) NITRO(LOT,IPCH) = 0.0
      IF (CARB(LOT, IPCH) .LT. 0.0) CARB(LOT, IPCH) = 0.0
      RETURN
      END
END OF FILE
```

```
      1            FUNCTION MAXRA(IYR)
      2      C     MAXIMUM RAINFALL FUNCTION: RETURNS DAY OF AGRICULTURAL YEAR ON
      3      C     WHICH MAXIMUM RAINFALL IN 24 HOURS OCURRED.
      4            COMMON/WEACOM/ RAIN(366), EVAP(366), RINSOL(366)
      5            MRCALD = 0
      6            MAXRA = 0
      7            RAINMA = 0.
      8            NDIYR = 365
      9            IF (MOD(IYR, 4) .EQ. 0) NDIYR = 366
     10            DO 100 ICALDA = 1, NDIYR
     11            IF (RAIN(ICALDA) .GE. RAINMA) GO TO 101
     12            GO TO 100
     13        101 CONTINUE
     14      C     IDENTIFICATION OF RAINFALL MAXIMUM (RANMA) AND MAXIMUM RAINFALL
     15      C     CALENDAR DAY (MRCALD)
     16            RAINMA = RAIN(ICALDA)
     17            MRCALD = ICALDA
     18        100 CONTINUE
     19      C     CONVERSION OF CALENDAR DAY TO AGRI. YR. DAY
     20            MAXRA = MRCALD + NDIYR - 182
     21            IF (MRCALD .GE. (NDIYR - 182)) MAXRA = MRCALD - NDIYR + 183
     22            RETURN
     23            END
END OF FILE
```

```
      SUBROUTINE MZYLD(LOT, IPCH)
C     MAIZE YIELD SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE,
     1 PHADJ, PRYLME, PRYL, DENSRI, DENSMZ, DENSMN
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/BANDCM/ INIT
      COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     1 YLDCA, YLDFA
      COMMON/TECHN/ TECH(9), START(9)
      EXTERNAL ARAND, BRAND
C     INITIALIZATION OF INTERPLANTED RICE AND MANIOC DENSITIES AND
C     MULTIPLIERS FOR DISEASE, RATS, AND GERMINATION
      DENSRI = 0.0
      DENSMN = 0.0
      DISMUL = 1.0
      RATMUL = 1.0
      GERMUL = 1.0
C     INTERPLANTED CROP DENSITY ASSIGNMENT
      LU = LUSE(LOT, IPCH)
      IF (LU .EQ. 6 .OR. LU .EQ. 15 .OR. LU .EQ. 17) GO TO 100
      GO TO 101
  100 CONTINUE
C     FOR INTERPLANTED RICE
      DENSRI = BRAND(1.18D5, 1.26D5)
      IF (DENSRI .LE. 0.0) DENSRI = 0.0
      DENSMZ = BRAND(3.444D3, 3.507D3)
      IF (DENSMZ .LE. 0.) DENSMZ = 0.
  101 CONTINUE
      IF (LU .EQ. 14 .OR. LU .EQ. 15 .OR. LU .EQ. 17) GO TO 102
      GO TO 103
  102 CONTINUE
C     FOR INTERPLANTED MANIOC
      DENSMN = BRAND(2.647D3, 5.329D3)
      IF(DENSMN .LE. 0.0) DENSMN = 0.0
      DENSMZ = BRAND(3.530D3, 5.119D3)
  103 CONTINUE
C     DISEASE DECISION
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.018) DISMUL = 0.40
C     FOR OTHER INTERPLANTED CROPS
      IF (LU .EQ. 9 .OR. LU .EQ. 11) DENSMZ = BRAND(2.793D3, 5.624D3)
C     MAIZE ALONE ONLY
      IF (LU .EQ. 7) DENSMZ = BRAND(4.344D3, 6.275D3)
C     PH ADJUSTMENT FOR RESPONSE PLATEAU
      PHADJ = 6.0
      IF (PH(LOT, IPCH) .LE. PHADJ) PHADJ = PH(LOT, IPCH)
      IF (DENSMZ .LE. 0.0) DENSMZ = 0.0
C     CALCULATION OF REGRESSION PREDICTED YIELD (KG / 1000 PLANTS)
      PRYLME = 125. * PHADJ - 2.92E-2 * DENSMZ - 2.22E-2 * DENSMN
     1 - 8.16E-4 * DENSRI - 330.
      PRYL = BRAND(1.51D2, PRYLME)
      IF (PRYL .LE. 0.) PRYL = 0.
C     SEVERE RAT DAMAGE (INTENSITY 3 OR 4) DECISION
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.388) RATMUL = BRAND(4.7D-1, 5.6D-1)
      IF (RATMUL .LE. 0.) RATMUL = 0.
```

```
     61      C      POOR GERMINATION DECISION
     62             XRAN = ABAND(INIT, -1.)
     63             IF (XRAN .LT. 0.071) GERMUL = 0.97
     64             IF (DENSMZ .LE. 0.) DENSMZ = 0.
     65      C      MAIZE YIELD CALCULATION (KG / HA)
     66             YLDMZ = PRYL * DENSMZ * 0.001 * DISMUL * RATMUL * GERMUL
     67      C      ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
     68             YLDMZ = YLDMZ * TECH(2)
     69             IF (YLDMZ .LE. 0.) YLDMZ = 0.
     70             RETURN
     71             END
END OF FILE
```

```
      1            FUNCTION NODIM(MO, MOTYPE)
      2      C     NUMBER OF DAYS IN MONTH FUNCTION. ARGUMENTS ARE MONTH AND MONTH
      3      C     TYPE (1=CALENDAR , 2=AGRICULTURAL)
      4            COMMON/DATE/ IYR
      5            IF (MOTYPE .EQ. 1)GO TO(100,101, 100, 102, 100, 102, 100, 100,
      6           1 102, 100, 102, 100), MO
      7            IF (MOTYPE .EQ. 2) GO TO (100, 100, 102, 100, 102, 100, 100, 101,
      8           1 100, 102, 100, 102), MO
      9            WRITE (6, 1000) MO, MOTYPE
     10       1000 FORMAT(1X, 'ERROR: MONTH', I5, 2X, 'OR TYPE', I5, 2X, 'NOT RECOGNI
     11           1ZED IN FUNCTION NODIM')
     12            CALL SYSTEM
     13        100 NODIM = 31
     14            GO TO 103
     15        101 NODIM = 28
     16            IF (MOD(IYR, 4) .EQ. 0) NODIM = 29
     17            GO TO 103
     18        102 NODIM = 30
     19        103 CONTINUE
     20            RETURN
     21            END
END OF FILE
```

```
      1            SUBROUTINE PAYLD(LOT, IPCH)
      2      C     PASTURE YIELD SUBROUTINE: CALCULATES KG CATTLE LIVE WEIGHT GAIN
      3      C     PER HECTARE PER YEAR ON A GIVEN PATCH ASSUMING THAT THE PATCH IS
      4      C     STOCKED AT THE PASTURE FEEDING CAPACITY.
      5            DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE, DWTPH
      6            COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
      7           1 CONTIN(1, 9)
      8            COMMON/PASTUR/ BASEPY, YREFF(5), PACOEF, PACONS, PACHIP, WGPTDN,
      9           1 TDNPDM
     10            COMMON/TECHN/TECH(9), START(9)
     11            COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9), NITRO(1,
     12           1 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
     13            COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     14           1 YLDCA, YLDPA
     15      C     ASSIGNMENT OF YEAR EFFECT (EFFECT OF WEEDS)
     16            YEAREF = 0.
     17            IPYEAR = IDUR(LOT, IPCH) / 365
     18            IF (IPYEAR .LE. 1) IPYEAR = 1
     19            IF (IPYEAR .LE. 5) YEAREF = YREFF(IPYEAR)
     20      C     CALCULATION OF DRY WEIGHT PER HA PASTURE PRODUCED FROM BASE PASTURE
     21      C     YIELD, YEAR EFFECT, AND THE COEFFICIENT AND CONSTANT FROM THE
     22      C     PASTURE YIELD REGRESSION ON PHOSPHORUS
     23            DWTPH = BASEPY * (PACOEF * PHOS(LOT, IPCH) + PACONS) * YEAREF
     24      C     CALCULATION FOR HIGH (PLATEAU) PHOSPHORUS LEVELS
     25            IF (PHOS(LOT, IPCH) .GE. 10.) DWTPH = PACHIP * BASEPY * YEAREF
     26      C     CALCULATION OF CATTLE LIVE WEIGHT GAIN FROM PASTURE DRY WEIGHT
     27      C     YIELD (USEING WEIGHT GAIN PER KG TOTAL DIGESTIBLE NUTRIENTS AND
     28      C     KG TOTAL DIGESTIBLE NUTRIENTS PER KG DRY MATTER).
     29            YLDPA = DWTPH * WGPTDN* TDNPDM
     30      C     ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
     31            YLDPA = YLDPA * TECH(9)
     32            IF (YLDPA .LE. 0.) YLDPA = 0.
     33            RETURN
     34            END
END OF FILE
```

```
      SUBROUTINE PEYLD(LOT, IPCH)
C     PEPPER YIELD SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, ELLIM,
     1 PHADJ, CADJ, PADJ, SLOPE
      COMMON/FERT/ ELLIM(2), DOSECA(4, 2, 3), DOSEPE(4, 2, 4),
     1 PRICFE(5), PFERT(2), SLOLI, CONSLI, ALLIME,
     2 SLOPHO, CONPHO, IFERT(1, 9)
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/DATE/ IYR
      COMMON/TECHN/ TECH(9), START(9)
      COMMON/YIELDS/ YLDR1, YLDM2, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     1 YLDCA, YLDPA
      COMMON/DISEA/ PINFEC(3, 2), LSPORE(3), IBPOD(1, 9),
     1 IWBROO(1, 9), IFUSAP(1, 9), IWBEST, IPUEST, IBPEST, BPMULT,
     2 WBMULT, FUMULT, PRDIES(3)
      EXTERNAL BRAND
C     FOLLOWING FOR DEATH OF PEPPER EXCEEDING
C     LIFE EXPECTANCY OF 12.5 YEARS (4566 DAYS)
      IF (IDUR(LOT, IPCH) .LT. 4566) GO TO 101
      YLDPE = 0.0
      LUSE(LOT, IPCH) = 2
      IDUR(LOT, IPCH) = 0
      GO TO 900
  101 CONTINUE
C     ADJUSTMENTS FOR RESPONSE PLATEAUS (PEPPER CRITICAL PH, P AND C)
      PECRPH = 5.5
      PECRP = 10.
      PECRC = 2.0
      PHADJ = PH(LOT, IPCH)
      IF (PHADJ .GE. PECRPH) PHADJ = PECRPH
      CADJ = CARB(LOT, IPCH)
      IF (CADJ .GE. PECRC) CADJ = PECRC
      IF (IFERT(LOT, IPCH) .EQ. 1) CADJ = PECRC
      PADJ = PHOS(LOT, IPCH)
      IF (PADJ .GE. PECRP) PADJ = PECRP
C     PEPPER YIELD FROM SOIL AS PROP. OF MAX. YIELD MEAN
      YFSPMM = 0.292 * PHADJ + 0.382 * CADJ + 0.055 * PADJ - 2.119
C     PEPPER YIELD FROM SOIL AS PROP. OF MAX. YIELD
      YFSPMY = SNGL(BRAND(1.87D-1, DBLE(YFSPMM)))
C     PEPPER YIELD FROM SOIL (KG/HA DRY SEEDS) ADJUSTED FOR ALTAMIRA
      PEYFS = YFSPMY * START(8)
C     PEPPER YEAR EFFECT (FOR FIELDS OVER 4 YEARS OLD)
      PEYREF = 1.
      IF (IDUR(LOT, IPCH) .GE. 1461) GO TO 100
      PEYREF = 0.80
      IF (IDUR(LOT, IPCH) .LT. 1096) PEYREF = 0.40
      IF (IDUR(LOT, IPCH) .LT. 730)  PEYREF = 0.
  100 CONTINUE
C     FUSARIUM DISEASE EFFECT
      FUSEFF = 1.
      IF (IFUSAR(LOT, IPCH) .EQ. IYR) FUSEFF = FUMULT
C     CALCULATION OF PEPPER YIELD (KG / HA)
      YLDPE = PEYFS * FUSEFF
C     ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
      YLDPE = YLDPE * TECH(8)
      IF (YLDPE .LE. 0.) YLDPE = 0.
```

```
     61         900 CONTINUE
     62             RETURN
     63             END
END OF FILE
```

```
      SUBROUTINE RIYLD(LOT, IPCH)
C     RICE YIELD SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE,
     1 PRYL, PRYLMX, YLDMAX, CADJ, PADJ
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/RANDOM/ INIT
      COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     1 YLDCA, YLDPA
      COMMON/TECHN/ TECH(9), START(9)
      EXTERNAL ARAND, BRAND
C     INITIALIZATION OF DISEASE, TOPPLING AND VARIETY MULTIPLIERS
      DISMUL = 1.0
      TOPMUL = 1.0
      VARMUL = 1.0
      DENS = SNGL(BRAND(6.879D1, 1.0967D2))
      IF (DENS .LE. 0.) DENS = 0.
C     ASSIGNMENT OF VARIETY
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.844) GO TO 100
      IF (XRAN .GE. 0.844 .AND. XRAN .LT. 0.900) GO TO 101
      IF (XRAN .GE. 0.900) GO TO 102
  100 CONTINUE
C     FOR HYBRID VARIETIES (IAC1246 & IAC101)
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.019) DISMUL = 0.806
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.133) TOPMUL = SNGL(BRAND(5.6D-1, 7.6D-1))
      IF (TOPMUL .LE. 0.) TOPMUL = 0.
      GO TO 103
  101 CONTINUE
C     FOR "OTHER" VARIETIES
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.143) DISMUL = 0.806
      VARMUL = 0.823
  103 CONTINUE
C     FOR BOTH HYBRID AND "OTHER" VARIETIES - CALCULATION OF EXPERIMENT
C     STATION YIELD
      IF (DENS .LE. 111.) ESYLD = 27.9 * DENS
      IF (DENS .GT. 111. .AND. DENS .LT. 222.) ESYLD = 8.72 * DENS  +
     1 2166.
      IF (DENS .GE. 222.) ESYLD = 4102.
      GO TO 104
  102 CONTINUE
C     FOR TRADITIONAL VARIETY (CANELA DE FERRO)
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.120) DISMUL = 0.806
      IF (DENS .LT. 111.) ESYLD = 20.5 * DENS
      IF (DENS .GE. 111.) ESYLD = 2278.
  104 CONTINUE
C     INITIALIZATION OF PASTURE AND OTHER INTERPLANTED CROP MULTIPLIERS
C     AND MAIZE DENSITY
      PAMUL = 1.0
      OICMUL = 1.0
      DENSMZ = 0.0
C     LAND USE MULTIPLIERS ASSIGNED
      LU = LUSE(LOT, IPCH)
```

```
      SUBROUTINE PSYLD(LOT, IPCH)
C     PHASEOLUS YIELD SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE,
     1 PRYL, PHADJ, PRYLME
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/RANDOM/ INIT
      COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     1 YLDCA, YLDPA
      COMMON/TECHN/ TECH(9), START(9)
      COMMON/HISTOR/ VIRGSO(1, 9)
      EXTERNAL ARAND, BRAND
C     INITIALIZATION OF INTERPLANTED MAIZE DENSITY AND DISEASE MULTIPLIER
      DENSMZ = 0.0
      DISMUL = 1.0
C     PHASEOLUS SEED DENSITY (KG SEEDS SOWN / HA) ASSIGNMENT
      SEEDDE = SNGL(BRAND(2.612D1, 2.919D1))
C     PHASEOLUS PLANTING DENSITY (PLANTS / HA) CALCULATION
      DEPSME = 1602.8 * SEEDDE
      DENSPS = SNGL(BRAND(5.5966D4, DBLE(DEPSME)))
      IF (DENSPS .LE. 1.0) DENSPS = 1.0
C     INTERPLANTED MAIZE DENSITY ASSIGNMENT
      IF (LUSE(LOT, IPCH) .EQ. 9) DENSMZ =
     1 SNGL(BRAND(3.688D3, 6.698D3))
      IF (DENSMZ .LE. 0.0) DENSMZ = 0.0
C     PH ADJUSTMENT FOR RESPONSE PLATEAU
      PHADJ = 5.7
      IF (PH(LOT, IPCH) .LE. PHADJ) PHADJ = PH(LOT, IPCH)
C     CALCULATION OF REGRESSION PREDICTED YIELD (KG / KG SEED SOWN)
      PRYLME = 13.78 * PHADJ - 69.77 *ALOG10(DENSPS) - 1.50E-3 * DENSMZ
     1 + 267.64
      PRYL = BRAND(2.98D1, PRYLME)
      IF (PRYL .LE. 0.) PRYL = 0.
C     DISEASE DECISION
      IF (VIRGSO(LOT, IPCH) .EQ. 2) GO TO 100
C     FOR PLANTING IN VIRGIN SOIL
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.909) GO TO 101
      GO TO 102
  101 CONTINUE
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.78) GO TO 100
      GO TO 102
  100 CONTINUE
C     FOR DISEASED PHASEOLUS (RHIZOCTONIA)
      DISMUL = SNGL(BRAND(5.7D-1, 3.5D-1))
      IF (DISMUL .LE. 0.) DISMUL = 0.
  102 CONTINUE
C     CALCULATION OF PHASEOLUS YIELD (KG/HA)
      YLDPS = PRYL * SEEDDE * DISMUL
C     ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
      YLDPS = YLDPS * TECH(3)
      IF (YLDPS .LE. 0.0) YLDPS = 0.0
      RETURN
      END
END OF FILE
```

```
      IF (LU .EQ. 19) PAMUL = 0.81
      IF (LU .EQ.  9 .OR. LU .EQ. 13) OICMUL = 0.81
      IF (LU .EQ. 15 .OR. LU .EQ. 16) OICMUL = 0.81
      IF (LU .EQ. 17)OICMUL = 0.81
      IF (LU .EQ.  6 .OR. LU .EQ. 15 .OR. LU .EQ. 17) DENSMZ =
     1 SNGL(BRAND(3.444D3, 3.507D3))
      IF (DENSMZ .LE. 0.) DENSMZ = 0.
C     CARBON & PHOSPHORUS ADJUSTMENT FOR RESPONSE PLATEAU
      CADJ = 2.0
      IF (CARB(LOT, IPCH) .LE. CADJ) CADJ = CARB(LOT, IPCH)
      PADJ = 12.0
      IF (PHOS(LOT, IPCH) .LE. PADJ) PADJ = PHOS(LOT, IPCH)
C     CALCULATION OF PREDICTED YIELD FROM REGRESSION (PROPORTION)
      PRYLME = 0.59699 * CADJ - 1.5236E-5 * DENSMZ + 1.6996E-2 * PADJ
     1 - 9.4706E-2 * AL(LOT, IPCH) - 6.0286E-3
      PRYL = BRAND(2.0288D-1, PRYLME)
      IF (PRYL .LE. 0.) PRYL = 0.
C     CALCULATION OF MAXIMUM EXPECTED YIELD
      YLDMAX = ESYLD * PRYL
C     INITIALIZATION OF GERMINATION AND SEASON MULTIPLIERS
      GERMUL = 1.0
      SEAMUL = 1.0
C     POOR GERMINATION DECISION
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.047) GERMUL = 0.79
C     OUT OF SEASON PLANTING DECISION
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.034) SEAMUL = SNGL(BRAND(2.3D-1, 1.7D-1))
      IF (SEAMUL .LE. 0.) SEAMUL = 0.
C     CALCULATION OF RICE YIELD (KG / HA)
      YLDRI = YLDMAX * TOPMUL * SEAMUL * PAMUL * OICMUL * GERMUL *
     1 DISMUL
C     ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
      YLDRI = YLDRI * TECH(1)
      IF (YLDRI .LE. 0.) YLDRI = 0.
      RETURN
      END
END OF FILE
```

```
      SUBROUTINE SGBQ(LOT, IPCH)
C     SECOND GROWTH BURN QUALITY PREDICTION SUBROUTINE
      DOUBLE PRECISION BRAND
      INTEGER BUQUAL, BUTYP
      COMMON/DATE/ IYR
      COMMON/BQCALL/ LLOTV, LYRV, LLOTSG, LYRSG, LLOTW, LYRW
      COMMON/RANDOM/ INIT
      COMMON/BURNS/ BUTYP(1, 9), BUQUAL(1, 9)
      COMMON/WEATOT/ RAINSU, EVAPSU, RINSSU
      EXTERNAL IDAGYR, ARAND, BRAND
C     FOLLOWING ASSIGNS BURN QUALITY OF THE FIRST SECOND GROWTH PATCH
C     IN LOT FOR A GIVEN YEAR TO ANY SUBSEQUENT SECOND GROWTH BURNS IN
C     THAT LOT AND YEAR.
      IF (IYR .NE. LYRSG) GO TO 200
      IF (LOT .EQ. LLOTSG) GO TO 201
      LLOTSG = LOT
      GO TO 200
  201 BUQUAL(LOT, IPCH) = LSTCBQ
      GO TO 102
  200 CONTINUE
      LLOTSG = LOT
C     ASSIGNMENT OF CALENDAR MONTH OF CUTTING
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.009) MOCUT = 6
      IF (XRAN .GE. 0.009 .AND. XRAN .LT. 0.081) MOCUT = 7
      IF (XRAN .GE. 0.081 .AND. XRAN .LT. 0.153) MOCUT = 8
      IF (XRAN .GE. 0.153 .AND. XRAN .LT. 0.504) MOCUT = 9
      IF (XRAN .GE. 0.504 .AND. XRAN .LT. 0.718) MOCUT = 10
      IF (XRAN .GE. 0.718 .AND. XRAN .LT. 0.898) MOCUT = 11
      IF (XRAN .GE. 0.898 .AND. XRAN .LT. 0.988) MOCUT = 12
      IF (XRAN .GE. 0.988) MOCUT = 1
      XRAN = ARAND(INIT, -1.)
      ICUTDM = INT(XRAN * 30.)
      ICUTDY = IDAGYR(ICUTDM, MOCUT)
C     ASSIGNMENT OF DAYS BETWEEN CUTTING AND BURNING
      DBCB = SNGL(BRAND(9.6D1, 5.3D1))
      IDBCB = IFIX(DBCB)
      IF (IDBCB .LT. 1) IDBCB = 1
C     CALCULATION OF BURNING DAY OF YEAR
      IBUDYR = ICUTDY + IDBCB
C     CALCULATION OF WEATHER BETWEEN CUTTING AND BURNING
      CALL WEABD(ICUTDY, IBUDYR)
      RAINCB = RAINSU
      EVAPCB = EVAPSU
      RINSCB = RINSSU
C     CALCULATION OF BURN DISCRIMINANT FUNCTIONS
      GOOD = -3.38E-3 * RAINCB + 2.06E-2 * EVAPCB + 6.09E-4 * RINSCB
     1 - 1.00
      BAD = -4.84E-4 * RAINCB + 1.39E-2 * EVAPCB - 2.90E-3 * RINSCB
     1 - 0.237
C     BURN QUALITY DECISION
      IF (GOOD .GT. BAD) GO TO 100
      GO TO 101
  100 CONTINUE
C     FOR CASE OF GOOD BURN PREDICTED BY DISCRIMINANT FUNCTION
      XRAN = ARAND(INIT, -1.)
      BUQUAL(LOT, IPCH) = 1
      IF (XRAN .LT. 0.643) BUQUAL(LOT, IPCH) = 2
      GO TO 102
  101 CONTINUE
```

```
     C      FOR CASE OF BAD BURN PREDICTED BY DISCRIMINANT FUNCTION
            XRAN = ARAND(INIT, -1.)
            BUQUAL(LOT, IPCH) = 1
            IF (XRAN .LT. 0.350) BUQUAL(LOT, IPCH) = 2
        102 CONTINUE
            LSTCBQ = BUQUAL(LOT, IPCH)
            LYRSG = IYR
            BUTYP(LOT, IPCH) = 2
            RETURN
            END
END OF FILE
```

```
      SUBROUTINE SMYLD(LOT, IPCH)
C     SWEET MANIOC YIELD SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE,
     1 PRYLME, PRYL, PHADJ
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/TECHN/ TECH(9), START(9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/YIELDS/ YLDMI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
     1 YLDCA, YLDPA
      EXTERNAL BRAND
C     FOLLOWING PREVENTS MANIOC YIELD FROM BEING COUNTED
C     MORE THAN ONCE.  YIELDS HERE ARE ONLY COUNTED IN
C     THE FIRST YEAR.  A NEGATIVE YIELD IS RETURNED TO
C     THE LOTPRO SUBROUTINE TO INDICATE A SECOND YEAR
C     FIELD FOR WHICH THE YIELD IS NOT TO BE COUNTED
      YLDSM = -1.0
      IF (IDUR(LOT, IPCH) .GE. 365) GO TO 900
C     INITIALIZATION OF GROWTH PERIOD MULTIPLIER
      GTHMUL = 1.0
C     ASSIGNMENT OF GROWTH PERIOD (DAYS)
      GTHPER = SNGL(BRAND(1.03D2, 4.71D2))
      IF (GTHPER .LE. 0.) GTHPER = 0.
C     PH ADJUSTMENT FOR RESPONSE PLATEAU
      PHADJ = 5.0
      IF (PH(LOT, IPCH) .LE. PHADJ) PHADJ = PH(LOT, IPCH)
C     REGRESSION PREDICTED YIELD (KG FARINHA / HA / 12 MONTHS GROWTH)
      PRYLME = 587.5 * PHADJ - 1559.2
      PRYL = BRAND(8.15D1, PRYLME)
C     ASSIGNMENT OF GROWTH PERIOD MULTIPLIER
      IF (GTHPER .LT. 365.) GTHMUL = SNGL(BRAND(3.74D0, 3.77D0))
      IF (GTHMUL .LE. 0.) GTHMUL = 0.
C     SWEET MANIOC YIELD CALCULATION (KG FARINHA / HA)
      YLDSM = PRYL * GTHPER / 365. * GTHMUL
      IF (YLDSM .LE. 0.) YLDSM = 0.
C      ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
      YLDSM = YLDSM * TECH(6)
  900 CONTINUE
      RETURN
      END
END OF FILE
```

```
1            SUBROUTINE SOILLP(LOT, IPCH)
2       C    LOT PRODUCTION SUBROUTINE FOR SOILMAIN (RUN OF AGRICULTURAL
3       C    PRODUCTION SECTOR ONLY)
4            COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
5           1 CONTIN(1, 9)
6            COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBM, YLDSM, YLDPE,
7           1 YLDCA, YLDPA
8            COMMON/SIZES/ LOTS, NOPCHS, SIZLOT, SIZPCH
9            IF (LUSE(LOT, IPCH) .EQ. 23) GO TO 117
9.5          IF (LUSE(LOT, IPCH) .EQ. 20) GO TO 113
9.7          IF (LUSE(LOT, IPCH) .EQ. 21) GO TO 114
9.76         IF (LUSE(LOT, IPCH) .GE. 2 .AND. LUSE(LOT, IPCH) .LE. 4)
9.82        1 GO TO 100
10      C    LAND USE SAVED
11           LUSAVE = LUSE(LOT, IPCH)
12      C    SKIPS NON-CULTIVATED YEARS FOR ANNUAL CROPS
12.5         IF (LUSE(LOT, IPCH) .LE. 4) GO TO 100
13      C    RICE ALONE
14           LUSE(LOT, IPCH) = 5
15           CALL RIYLD(LOT, IPCH)
16           CALL USECNT(1, YLDRI)
17      C    RICE WITH MAIZE
18           LUSE(LOT, IPCH) = 6
19           CALL MZYLD(LOT, IPCH)
20           CALL USECNT(4, YLDMZ)
21      C    RICE INTERPLANTED
22           CALL RIYLD(LOT, IPCH)
23           CALL USECNT(2, YLDRI)
24      C    MAIZE ALONE
25           LUSE(LOT, IPCH) = 7
26           CALL MZYLD(LOT, IPCH)
27           CALL USECNT(3, YLDMZ)
28      C    PHASEOLUS ALONE
29           LUSE(LOT, IPCH) = 8
30           CALL PSYLD(LOT, IPCH)
31           CALL USECNT(5, YLDPS)
32      C    VIGNA ALONE
33           LUSE(LOT, IPCH) = 10
34           CALL VIYLD(LOT, IPCH)
35           CALL USECNT(6, YLDVI)
36      C    BITTER MANIOC
37           LUSE(LOT, IPCH) = 12
38      C    IDUR SET TEMPORARILY AT ZERO TO CAUSE BMYLD AND
39      C    SMYLD TO OUTPUT YIELD PER YEAR FOR BOTH FIRST YEAR AND
40      C    LATER YEARS
41           ID = IDUR(LOT, IPCH)
42           IDUR(LOT, IPCH) = 0
43           CALL BMYLD(LOT, IPCH)
44      C    FOLLOWING FOR "NEGATIVE YIELDS" ASSIGNED IN BMYLD
45      C    INDICATING SECOND YEAR MANIOC NOT TO BE COUNTED
46           CALL USECNT(7, YLDBM)
47      C    SWEET MANIOC ALONE
48           LUSE(LOT, IPCH) = 16
49           CALL SMYLD(LOT, IPCH)
50      C    FOLLOWING FOR "NEGATIVE YIELDS" ASSIGNED IN SMYLD
51      C    INDICATING SECOND YEAR MANIOC NOT TO BE COUNTED
52           CALL USECNT(8, YLDSM)
52.3    C    LAND USE RESET TO RICE ALONE FOR SOIL CHANGE PURPOSES
52.6         LUSE(LOT, IPCH) = LUSAVE
52.7    C    IDUR RESET TO ORIGINAL VALUE
```

```
     52.8           IDUR(LOT, IPCH) = ID
     52.9           GO TO 100
     53         113 CONTINUE
     54       C     CACAO
     55             ID = IDUR(LOT, IPCH)
     56       C     IDUR SET TO 2000 DAYS FOR MATURE YIELD FOR CACAO AND PEPPER
     57             IDUR(LOT, IPCH) = 2000
     58             CALL CAYLD(LOT, IPCH)
     59             CALL USECNT(9, YLDCA)
     59.2           IDUR(LOT, IPCH) = ID
     59.4           GO TO 100
     59.6       114 CONTINUE
     60       C     BLACK PEPPER
     61             ID = IDUR(LOT, IPCH)
     61.3     C     IDUR SET TO 2000 DAYS FOR MATURE YIELD FOR CACAO AND PEPPER
     61.6           IDUR(LOT, IPCH) = 2000
     62             CALL PEYLD(LOT, IPCH)
     63             CALL USECNT(10, YLDPE)
     66       C     IDUR RESET TO ORIGINAL VALUE
     67             IDUR(LOT, IPCH) = ID
     68             GO TO 100
     69         117 CONTINUE
     70       C     PASTURE WITH ANIMALS
     71             CALL PAYLD(LOT, IPCH)
     72             CALL USECNT(11, YLDPA)
     73         100 CONTINUE
     74             RETURN
     75             END
END OF FILE
```

```
      SUBROUTINE SUMNT(LOT)
C     MAINTENANCE SUBROUTINE FOR SOIL QUALITY (SOILMAIN) RUNS:
C     MAINTENANCE OF PERENNIAL CROPS
      REAL*8 DLOG
      DOUBLE PRECISION ELLIM, PHOS, PH, AL, NITRO, CARB, CLAY,
     1 SLOPE
      COMMON/FERT/ ELLIM(2), DOSECA(4, 2, 3), DOSEPE(4, 2, 4),
     1 PRICFE(5), PFERT(2), SLOLI, CONSLI, ALLIME, SLOPHO, CONPHO,
     2 IFERT(1, 9)
      COMMON/RANDOM/ INIT
      COMMON/SOIL/PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/SIZES/ LOTS, NOPCHS, SIZLOT, SIZPCH
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      EXTERNAL ARAND
C     INITIALIZATION OF CACAO AND PEPPER FERTILIZATION INDICATORS
      ICACF = 0
      IPIMF = 0
      DO 100 IP = 1, NOPCHS
      IPCH = IP
      IFERT(LOT, IP) = 0
      IF (LUSE(LOT, IP) .LE. 19) GO TO 100
      IF (LUSE(LOT, IP) .GE. 22) GO TO 100
C     ASSIGNMENT OF YEAR CLASS FOR FERTILIZER DOSE CALCULATIONS
      IYRCL = 4
      IF (LUSE(LOT,IP) .EQ. 20) IYRCL = 3
      IF (IDUR(LOT, IPCH) .LE. 730) IYRCL = 2
      IF (IDUR(LOT, IPCH) .LE. 365) IYRCL = 1
C     ASSIGNMENT OF PHOSPHORUS LEVEL FOR FERTILIZER DOSE CALCULATIONS
      LEVP = 2
      IF (PHOS(LOT, IPCH) .LE. 10.) LEVP = 1
      IF (LUSE(LOT,IP) .EQ. 20 .AND. ICACF .LE. 1) GO TO 200
      IF (LUSE(LOT,IP) .EQ. 21 .AND. IPIMF .LE. 1) GO TO 201
      GO TO 100
  201 CONTINUE
C     DECISION FOR PEPPER FERTILIZATION (MADE ONCE FOR LOT AND YEAR)
      IF (IPIMF .EQ. 1) GO TO 204
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. PFERT(2)) GO TO 204
C     INDICATOR THAT PEPPER NOT FERTILIZED FOR LOT AND YEAR
      IPIMF = 2
      GO TO 100
  204 CONTINUE
C     INDICATOR THAT PEPPER IS TO BE FERTILIZED
      IPIMF = 1
      IPEREN = 2
C     FOR PEPPER
      PHOS(LOT, IPCH) = PHOS(LOT, IPCH) + SLOPHO *
     1 DOSEPE(1, LEVP, IYRCL) + CONPHO
      GO TO 203
  200 CONTINUE
C     DECISION FOR CACAO FERTILIZATION
      IF (ICACF .EQ. 1) GO TO 202
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. PFERT(1)) GO TO 202
C     INDICATOR THAT CACAO NOT TO BE FERTILIZED
      ICACF = 2
      GO TO 100
  202 CONTINUE
```

```
      C     INDICATOR THAT CACAO IS TO BE FERTILIZED
            ICACF = 1
            IPEREN = 1
      C     FOR CACAO
            PHOS(LOT, IPCH) = PHOS(LOT, IPCH) + SLOPHO *
           1 DOSECA(1, LEVP, IYRCL) + CONPHO
        203 CONTINUE
      C     ADJUSTMENTS FOR EITHER CACAO OR PEPPER FERTILIZATION
      C     LIMING DONE ONLY IN FIRST YEAR OF CROP
            IF (IYRCL .GE. 2) GO TO 300
            IF (AL(LOT, IPCH) .LE. 0.2) GO TO 300
            DOSELI = ALLIME * AL(LOT, IPCH)
            PH(LOT, IPCH) = PH(LOT, IPCH) + DOSELI * SLOLI + CONSLI
            AL(LOT, IPCH) = 11.43 - 7.68 * DLOG(PH(LOT, IPCH)) -
           1 6.27D-2 * CLAY(LOT, IPCH)
        300 CONTINUE
            IF (PH(LOT, IPCH) .GE. ELLIM(2)) PH(LOT, IPCH) = ELLIM(2)
            IF (PHOS(LOT, IPCH) .GE. ELLIM(1)) PHOS(LOT, IPCH) = ELLIM(1)
            IF (AL(LOT, IPCH) .LE. 0.) AL(LOT, IPCH) = 0.
      C     INDICATOR OF FERTILIZATION (USED IN PEYLD FOR TEMPORARY CARBON LEVEL)
            IFERT(LOT, IPCH) = 1
        100 CONTINUE
            RETURN
            END
END OF FILE
```

```
      SUBROUTINE SQPASO(LOT, IPCH)
C     PASTURE SOILS SUBROUTINE
      DOUBLE PRECISION BRAND
      REAL*8 DLOG
      DOUBLE PRECISION PCHME,PH1,PH2,RNCHME,TIME1,TIME2, ALME , PHSTAR
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE, CCHME
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/DATE/ IYR
      DIMENSION PHSTAR(1, 9)
      EXTERNAL BRAND
C     FOR PASTURE STARTING PH IN SOIL QUALITY RUNS
      IF (IYR .EQ. 2) GO TO 600
C     BYPASS IF PASTURE OLDER THAN 1 YR. "EQUILIBRIUM"
      IF(IDUR(LOT,IPCH).GE. 367) GO TO 100
C     CARBON CHANGE MEAN
      CCHME = 0.85265 - 0.655 * CARB(LOT, IPCH)
      CARB(LOT, IPCH) = CARB(LOT, IPCH) + BRAND(3.8327D-1, CCHME)
C     PHOSPHORUS CHANGE MEAN
      PCHME = 1.2603 - 0.62233 * PHOS(LOT, IPCH)
      PHOS(LOT, IPCH) = PHOS(LOT, IPCH) + BRAND(1.2296D0, PCHME)
C     NITROGEN CHANGE MEAN
      RNCHME = 9.4229D-2 - 6.9176D-1 * NITRO(LOT, IPCH)
      NITRO(LOT, IPCH) = NITRO(LOT, IPCH) + BRAND(5.9159D-2, RNCHME)
  100 CONTINUE
C     PH CHANGE MEAN
      IF (IDUR(LOT, IPCH) .GE. 730) GO TO 101
C     PASTURE ONE YEAR OLD OR LESS CONSIDERED AS ONE YEAR CHANGE
      TIME2 = 1.
      PH1 = 0.
C     STARTING PH SAVED WHEN PASTURE FIRST PLANTED
  600 PHSTAR(LOT, IPCH) = PH(LOT, IPCH)
      IF (IYR .EQ. 2) GO TO 900
      GO TO 102
  101 CONTINUE
C     PASTURE OLDER THAN RANGE OF REGRESSION (21 YEARS) ASSUMED TO STAY
C     AT "EQUILIBRIUM" PH AND ALUMINUM VALUES.  NOTE THAT STANDARD RUN
C     RESTRICTIONS ON PASTURE LIFE DUE TO WEEDS WILL ALSO PREVENT THIS.
      IF (IDUR(LOT, IPCH) .GE. 7670) GO TO 900
      TIME1=FLOAT(IDUR(LOT, IPCH)) / 365.25
      TIME2 = TIME1 + 1.
C     NOTE THAT NO STOCHASTIC TERM IS INCLUDED IN PH CALCULATIONS
C     PH1 IS CUMULATIVE PH CHANGE FROM BEGINNING OF TIME IN PASTURE TO
C     BEGINNING OF COMPARISON INTERVAL
C     PH2 IS CUMULATIVE PH CHANGE FROM PASTURE PLANTING TO END OF
C     COMPARISON INTERVAL
      PH1 = 3.1392 - 5.4735D-1 * PHSTAR(LOT, IPCH) - 8.7496D-1 / TIME1
  102 PH2 = 3.1392 - 5.4735D-1 * PHSTAR(LOT, IPCH) - 8.7496D-1 / TIME2
      PH(LOT, IPCH) = PH(LOT, IPCH) + PH2 - PH1
C     ALUMINUM REGRESSION FROM VIRGIN INITIAL SOIL QUALITIES USED
      ALME = 11.429 - 7.6772 * DLOG(PH(LOT, IPCH)) - 6.2741D-2
     1 * CLAY(LOT, IPCH)
      AL(LOT, IPCH) = BRAND(1.56D0, ALME)
  900 CONTINUE
C     RESTRICTIONS ON REALISTIC LEVELS OF SOIL CHARACTERS
      IF (PH(LOT, IPCH) .LE. 3.) PH(LOT, IPCH) = 3.
      IF (PH(LOT, IPCH) .GE. 8.5) PH(LOT, IPCH) = 8.5
      IF(AL(LOT, IPCH) .LE. 0.) AL(LOT, IPCH) = 0.
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     61              IF (PHOS(LOT, IPCH) .LE. 1.) PHOS(LOT, IPCH) = 1.
     62              IF (NITRO(LOT, IPCH) .LE. 0.01) NITRO(LOT, IPCH) = 0.01
     63              IF (CARB(LOT, IPCH) .LE. 0.01) CARB(LOT, IPCH) = 0.01
     64              RETURN
     65              END
END OF FILE
```

```
      SUBROUTINE SQSCH(LOT, IPCH)
C     SOIL CHANGE SUBROUTINE
      INTEGER BUQUAL, BUTYP
      DOUBLE PRECISION BRAND, DMIN1
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE, PHCH,
     1 ALCH, PCH,RNCH, CCHME, UBPHCH, UBALCH, UBPCH, UBNCH, PHBEFF,
     2 PBEFF, ALBEFF, RNBEFF, CBEFF, CCH
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/UTCOM/ LUMAXR(1, 9), DAYSBA(1, 9), DAYSAC(1, 9),
     1 DAYSTC(1, 9), DAYSPA(1, 9), DAYSFA(1, 9),
     2 RAINBA(1, 9), RAINAC(1, 9)
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/BURNS/ BUTYP(1, 9), BUQUAL(1, 9)
      COMMON/UBCHNG/ UBPHCH, UBALCH, UBPCH, UBNCH
      COMMON/BUCHNG/ PHCH, ALCH, PCH, RNCH
      COMMON/DATE/ IYR
      COMMON/BEFORE/ PHBEFF, ALBEFF, CBEFF, RNBEFF, PBEFF
      EXTERNAL BRAND
C     ASSIGNMENT OF BEFORE FIELD NUTRIENT VALUES
      RNBEFF = NITRO(LOT, IPCH)
      PHBEFF = PH(LOT, IPCH)
      ALBEFF = AL(LOT, IPCH)
      CBEFF = CARB(LOT, IPCH)
      PBEFF = PHOS(LOT, IPCH)
C     VIRGIN BURNS FOR ALL CROPS IN SECOND YEAR FOR SOILMAIN RUN
      IF (IYR .EQ. 2) GO TO 200
      IF (LUMAXR(LOT, IPCH) .EQ. 5) GO TO 100
C     UNBURNED SOIL CHANGE
  200 CALL UNBUCH(LOT, IPCH)
C     VIRGIN BURN EFFECTS
      IF (BUTYP(LOT, IPCH) .EQ. 1) CALL VBUEFF(LOT, IPCH)
C     SECOND GROWTH BURN EFFECTS
      IF (BUTYP(LOT, IPCH) .EQ. 2) CALL CBUEFF(LOT, IPCH)
C     WEED BURN EFFECTS
      IF (BUTYP(LOT, IPCH) .EQ. 3) CALL WBUEFF(LOT, IPCH)
      IF (BUTYP(LOT, IPCH) .GE. 1) GO TO 102
      PHCH = UBPHCH
      ALCH = UBALCH
      PCH = UBPCH
      RNCH = UBNCH
      GO TO 102
  100 CONTINUE
C     PASTURE SOILS
      CALL SQPASO(LOT, IPCH)
      GO TO 900
  102 CONTINUE
      PH(LOT, IPCH) = PH(LOT, IPCH) + PHCH
      AL(LOT, IPCH) = AL(LOT, IPCH) + ALCH
      PHOS(LOT, IPCH) = PHOS(LOT, IPCH) + PCH
      NITRO(LOT, IPCH) = NITRO(LOT, IPCH) + RNCH
C     CARBON CHANGE ASSIGNMENT
      CCHME = 4.3151D0 * RNCH -   5.2549D-1 * CARB(LOT, IPCH) +
     1 3.8721D0 * RNBEFF +  1.1566D-1
      CCH = BRAND(2.11D-1, CCHME)
      CARB(LOT, IPCH) = CARB(LOT, IPCH) + CCH
  900 CONTINUE
      IF (PH(LOT, IPCH) .LT. 3.5) PH(LOT, IPCH) = 3.5
      IF (PH(LOT, IPCH) .GE. 7.6) PH(LOT, IPCH) = 7.6
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```
     61              IF (AL(LOT, IPCH) .LT. 0.)  AL(LOT, IPCH) = 0.
     62              IF (PHOS(LOT, IPCH) .LT.1.0) PHOS(LOT, IPCH) = 1.0
     63              IF (NITRO(LOT, IPCH) .LT. 0.) NITRO(LOT, IPCH) = 0.
     64              IF (CARB(LOT, IPCH) .LT. 0.) CARB(LOT, IPCH) = 0.
     65        C     NON-FERTILIZED AND NON-FALLOW ELEMENT LEVELS KEPT WITHIN 95% CONFIDENCE
     66        C     LEVELS FOR RICE SOILS
     67              IF (DAYSTC(LOT, IPCH) .LT. 1.) PHOS(LOT, IPCH) =
     68             1  DMIN1(PHOS(LOT, IPCH), 1.145D1)
     69              IF (DAYSTC(LOT, IPCH) .LT. 1.) PH(LOT, IPCH) =
     70             1  DMIN1(PH(LOT, IPCH), 7.29D0)
     71              IF (LUMAXR(LOT, IPCH) .LE. 5) CARB(LOT, IPCH) =
     72             1 DMIN1(CARB(LOT, IPCH), 1.70D0)
     73              IF (LUMAXR(LOT, IPCH) .LE. 5) NITRO(LOT, IPCH) =
     74             1 DMIN1(NITRO(LOT, IPCH), 6.69D0)
     75        C       PASTURE IN SECOND YEAR OF RUN: SOPASO CALLED TO INITIALIZE
     76        C       STARTING PH
     77              IF (IYR .EQ. 2 .AND. LUSE(LOT, IPCH) .EQ. 23)
     78             1 CALL SOPASO(LOT, IPCH)
     79              RETURN
     80              END
END OF FILE
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```
1            SUBROUTINE SSQOUT(NORUN, NPCHAC, NPCHPA, NPCHCA)
2       C    SOIL QUALITY OUTPUT SUBROUTINE FOR SOILMAIN (AGRIC. SECTOR ONLY:
3       C    AREA-WIDE AVERAGES OF SOIL QUALITY MEASURES FOR LAND IN ANNUAL
4       C    CROPS OR IN PASTURE, INCLUDING FALLOW PERIODS BETWEEN USES
5            DOUBLE PRECISION PH, AL, CARB, NITRO, PHOS, PHSUM, CLAY, SLOPE
6            DOUBLE PRECISION ALSUM, CSUM, NSUM, PSUM, PHAVE, ALAVE, CAVE,
7           1 NAVE, PAVE, USNO
8
9            DIMENSION PHSUM(4), ALSUM(4), CSUM(4), PHAVE(4), ALAVE(4), CAVE(4)
10          1, NAVE(4), NSUM(4), PSUM(4), USNO(4), PAVE(4)
11           COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
12          1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
13           COMMON/SIZES/ LOTS, NOPCHS, SIZLOT, SIZPCH
14           COMMON/DATE/ IYR
15           COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
16          1 CONTIN(1, 9)
18           CALL FTNCMD('SET MINUSZERO=ON', 16)
19           IF (IYR .EQ. 1) GO TO 202
20           IF (IYR .GT. LASTYR) GO TO 202
21           GO TO 203
22      202  CONTINUE
23      C    FOR FIRST CALL OF YEAR OR FIRST CALL OF RUN
24           DO 204 IU=1,4
25           PHSUM(IU) = 0.
26           ALSUM(IU) = 0.
27           CSUM(IU) = 0.
28           NSUM(IU) = 0.
29           PSUM(IU) = 0.
30           USNO(IU) = 0.
31      204  CONTINUE
32      203  CONTINUE
33           I1 = 1
34           DO 101 I2 = 1,NOPCHS
34.2    C     USE CODES (IU)  1=ANNUAL 2=PASTURE 3=CACAO 4=PEPPER
35           IUS = 1
35.2         IF (I2 .GT. NPCHAC) IUS=2
35.4         IF (I2 .GT. (NPCHAC+NPCHPA)) IUS = 3
35.6         IF (I2 .GT. (NPCHAC+NPCHPA+NPCHCA)) IUS = 4
35.65   C    SKIPS PATCHES OF DEAD CACAO OR PEPPER
35.7         IF (IUS .EQ. 4 .AND. LUSE(I1, I2) .LT. 20 .AND.
35.8        1 LUSE(I1, I2) .GE. 2) GO TO 101
35.86        IF (IUS .EQ. 3 .AND. LUSE(I1, I2) .LT. 20 .AND.
35.92       1 LUSE(I1, I2) .GE. 2) GO TO 101
36           PHSUM(IUS) = PHSUM(IUS) + PH(I1,I2)
37           ALSUM(IUS) = ALSUM(IUS) + AL(I1,I2)
38           CSUM(IUS) = CSUM(IUS) + CARB(I1,I2)
39           NSUM(IUS) = NSUM(IUS) + NITRO(I1,I2)
40           PSUM(IUS) = PSUM(IUS) + PHOS(I1,I2)
41           USNO(IUS) = USNO(IUS) + 1.
42      101  CONTINUE
44           DO 206 I = 1,4
44.5    C    MISSING VALUES SET AT -99.
45           PHAVE(I) = -99.
46           ALAVE(I) = -99.
47           CAVE(I) = -99.
48           NAVE(I) = -99.
49           PAVE(I) = -99.
50           IF (USNO(I) .LE. 0.1) GO TO 206
51           PHAVE(I) = PHSUM(I) / USNO(I)
52           ALAVE(I) = ALSUM(I) / USNO(I)
```

```
      53            CAVE(I) = CSUM(I) / USNO(I)
      54            NAVE(I) = NSUM(I) / USNO(I)
      55            PAVE(I) = PSUM(I) / USNO(I)
      56          206 CONTINUE
      57            IF (IYR .EQ. 1) WRITE (7, 1001)
      58         1001 FORMAT(19X, 'BARE OR ANNUAL CROPS', 9X, '|', 14X,
      59           1 'PASTURE', 1X, / 'RUN', 2X, 'YR', 5X, 'PH', 8X, 'AL',
      60           2 5X, 'C', 7X, 'N', 6X, 'P', 7X, 'PH', 6X, 'AL', 6X, 'C',
      61           3 7X, 'N', 7X, 'P')
      61.5          IF (IYR .EQ. 1) WRITE (8, 1002)
      61.55      1002 FORMAT(26X, 'CACAO', 17X, '|', 14X,
      61.6          1 'PEPPER', 1X, / 'RUN', 2X, 'YR', 5X, 'PH', 8X, 'AL',
      61.7          2 5X, 'C', 7X, 'N', 6X, 'P', 7X, 'PH', 6X, 'AL', 6X, 'C',
      61.8          3 7X, 'N', 7X, 'P')
      62            WRITE (7, 1000) NORUN,IYR,(PHAVE(II), ALAVE(II), CAVE(II),
      63           1 NAVE(II), PAVE(II), II=1,2)
      64         1000 FORMAT(I3, I5, 10F8.3)
      64.3          WRITE (8, 1000) NORUN,IYR,(PHAVE(II), ALAVE(II), CAVE(II),
      64.6         1 NAVE(II), PAVE(II), II=3,4)
      65            LASTYR = IYR
      66            RETURN
      67            END
END OF FILE
```

```
      1            SUBROUTINE TECHNO
      2      C     TECHNOLOGICAL IMPROVEMENT SUBROUTINE
      3            DIMENSION IMPEND(9), YRLYIM(9)
      4            COMMON/DATE/ IYR
      5            COMMON/TECHN/ TECH(9), START(9)
      6            IF (IYR .GT. 1) GO TO 101
      7            READ (14, 1000) (START(IC),   IMPEND(IC), YRLYIM(IC),IC=1,9)
      8       1000 FORMAT(F5.0, I4, F7.2)
      9      C     ABOVE FORMAT 1000 FOR FILE "BANKDATA"
     10      C     INITIALIZATION OF TECHNOLOGICAL IMPROVEMENT FACTOR
     11            DO 200 ICR = 1,9
     12        200 TECH(ICR) = 1.
     13            GO TO 900
     14        101 CONTINUE
     15            DO 100 IC=1,9
     16            IF (IYR .GE. IMPEND(IC)) GO TO 100
     17            TECH(IC) = (START(IC) + FLOAT(IYR) * YRLYIM(IC)) / START(IC)
     18        100 CONTINUE
     19        900 CONTINUE
     20            RETURN
     21            END
END OF FILE
```

```
      SUBROUTINE UNBUCH(LOT, IPCH)
C     UNBURNED SOIL CHANGE SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PH, PHOS, AL, CLAY, SLOPE, CARB, NITRO, UBPHCH,
     1 UBPCH, UBNCH, PHUBCM, PUBCM, ALUBCM, RNUBCM, UBALCH, PHBEFF
      COMMON/UBCHNG/ UBPHCH, UBALCH, UBPCH, UBNCH
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9), NITRO(1,
     1 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/UTCOM/ LUMAXR(1, 9), DAYSBA(1, 9), DAYSAC(1, 9),
     1 DAYSTC(1, 9), DAYSPA(1, 9), DAYSFA(1, 9), RAINBA(1,
     2 9), RAINAC(1, 9)
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/RANDOM/ INIT
      EXTERNAL BRAND, ARAND
      PHBEFF = PH(LOT, IPCH)
C     PH UNBURNED CHANGE (PER YEAR) ASSIGNMENT
      PHUBCM=1.8594D0 - 4.1866D-1 * PH(LOT, IPCH)
      UBPHCH = BRAND(8.4175D-1, PHUBCM)
C     ALUMINUM UNBURNED CHANGE (PER YEAR) ASSIGNMENT
      ALUBCM = 4.8516D-6 - 1.5033D-5 * AL(LOT, IPCH)
     1  - 1.5317D-4 * UBPHCH
      UBALCH = BRAND(1.4465D-4, ALUBCM)
C     PHOSPHORUS UNBURNED CHANGE (PER YEAR) ASSIGNMENT
      IF (PHOS(LOT, IPCH) .LT. 1.01) GO TO 100
      IF (PHOS(LOT, IPCH) .LT. 10.01) GO TO 101
C     CASE OF BEFORE FIELD PHOSPHORUS GREATER THAN OR EQUAL TO 10 PPM
      PUBCM = 6.8086D0 - 1.4363D0* PHOS(LOT, IPCH)
      UBPCH = BRAND(6.583D0, PUBCM)
      GO TO 102
  100 CONTINUE
C     CASE OF BEFORE FIELD PHOSPHORUS LESS THAN OR EQUAL TO 1 PPM
      XRAN = ARAND(INIT, -1.)
      UBPCH = 0.
C     PROBABILITY OF NO CHANGE IN PHOSPHORUS
      IF (XRAN .LT. 0.648) GO TO 102
C     CASE OF PHOSPHORUS CHANGES GREATER THAN ZERO
      PUBCM = 1.4143D0 * PHBEFF - 3.4733D0
      UBPCH = BRAND(1.9841D0, PUBCM)
      GO TO 102
  101 CONTINUE
C     CASE OF BEFORE FIELD PHOSPHORUS IN 2 - 5 PPM RANGE
      PUBCM = 9.7151D-1 * UBPHCH - 1.0405D0 * PHOS(LOT, IPCH) +
     1 2.2395D-2 * ((DAYSBA(LOT, IPCH) + DAYSAC(LOT, IPCH)) / 365.25)
     2 + 2.167D0
      UBPCH = BRAND(2.5049D0, PUBCM)
C     NITROGEN UNBURNED CHANGE ASSIGNMENT
  102 RNUBCM = 9.16D-2 * CARB(LOT, IPCH) - 0.771 * NITRO(LOT, IPCH)
     1 - 3.68D-5 * DAYSAC(LOT, IPCH) + 1.30D-2 * PHBEFF + 4.18D-5
     2 * DBLE(DAYSFA(LOT, IPCH)) - 7.04D-2
      UBNCH = BRAND(3.61D-2, RNUBCM)
      RETURN
      END
END OF FILE
```

```
      1            SUBROUTINE USECNT(LUOCRC, YLD)
      2      C     LAND USE COUNT SUBROUTINE
      3            COMMON/LUOUT/USEOUT(3, 12), LOTUSE(12)
      4            USEOUT(1, LUOCRO) = USEOUT(1, LUOCRO) + 1.
      5            IF (LOTUSE(LUOCRO) .LE. 0) USEOUT(2, LUOCRO) = USEOUT(2, LUOCRO) +
      6           1  1.
      7            LOTUSE(LUOCRO) = 1
      8            USEOUT(3, LUOCRO) = USEOUT(3, LUOCRO) + YLD
      9            RETURN
     10            END
END OF FILE
```

```
      SUBROUTINE USETOT(LOT, IPCH, IPVLU, IP)
C     LAND USE TOTALS SUBROUTINE: COMPUTES DAYS SPENT IN EACH LAND USE
C     CATEGORY FOR USE IN CALCULATING SOIL CHANGES
      DOUBLE PRECISION BRAND
      DIMENSION ITEM(366)
      COMMON/UTCOM/ LUMAXR(1, 9), DAYSBA(1, 9), DAYSAC(1, 9),
     1 DAYSTC(1, 9), DAYSPA(1, 9), DAYSFA(1, 9),
     2 RAINBA(1, 9), RAINAC(1, 9)
      COMMON/DATE/ IYR
      COMMON/USECOM/ LUSE(1, 9), IDUR(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      EXTERNAL MAXRA, IDAGYR, BRAND
      IF (LOT .EQ. 1 .AND. IP .EQ. 1) MRAIND = MAXRA(IYR)
C     INITIALIZES ALL ITEMS AS "NO CATEGORY"
      DO 101 I2 = 1, 366
  101 ITEM(I2) = 1
      DAYSBA(LOT, IPCH) = 0.
      DAYSAC(LOT, IPCH) = 0.
      DAYSTC(LOT, IPCH) = 0.
      DAYSPA(LOT, IPCH) = 0.
      DAYSFA(LOT, IPCH) = 0.
      RAINBA(LOT, IPCH) = 0.
      RAINAC(LOT, IPCH) = 0.
C     CODES FOR "ITEMS", "LASTUS" AND "LU" (DIFFERENT FROM "LUSE" CODES
C     AND "LUMAXR" CODES) : 1=NO CATEGORY 2=BARE 3=ANNUAL CROPS 4="TREE"
C     CROPS  5=PASTURE  6=FALLOW (WEEDS OR SECOND GROWTH)
      ITEM(1) = LASTUS(LOT, IPCH)
      IF (LASTUS(LOT, IPCH) .EQ. 3) GO TO 400
      IF (LASTUS(LOT, IPCH) .EQ. 2) ITEM(60 - IDUR(LOT, IPCH)) = 6
      GO TO 401
  400 CONTINUE
C     FIELDS IN ANNUAL CROPS AT END OF LAST YEAR (AGRIC. YEAR) HARVESTING
      IF (IPVLU .GE. 12 .AND. IPVLU .LE. 15) GO TO 403
      IF (IPVLU .EQ. 16 .OR. IPVLU .EQ. 17) GO TO 404
      IF (IPVLU .EQ. 22 .OR. IPVLU .EQ. 24) GO TO 404
C     FOR PHASEOLUS COMBINATIONS
      IF (IPVLU .EQ. 8 .OR. IPVLU .EQ. 9) ITEM(IDAGYR(15, 8)) = 2
      GO TO 401
  403 CONTINUE
C     FOR BITTER MANIOC COMBINATIONS
      IGROW = IFIX(SNGL(BRAND(1.93D2, 4.72D2)))
  405 IF (IGROW .LE. IDUR(LOT, IPCH)) IGROW = IDUR(LOT, IPCH)
      IF (IGROW .GE. (IDUR(LOT, IPCH) + 365)) GO TO 501
      ITEM(IGROW - IDUR(LOT, IPCH) + 1) = 2
      GO TO 401
  404 CONTINUE
C     FOR SWEET MANIOC COMBINATIONS
      IGROW = IFIX(SNGL(BRAND(1.03D2, 4.71D2)))
      GO TO 405
  401 CONTINUE
C     PLANTING AND HARVESTING EVENTS FOR PRESENT AGRICULTURAL YEAR'S
C     CROP ACCORDING TO PRESENT YEAR'S LAND USE CODE
      LANDU = LUSE(LOT, IPCH)
      GO TO(1, 2, 2, 2, 5, 6, 7, 8, 9, 10, 11, 12, 12, 12, 12, 12, 12,
     1 18, 19, 20, 21, 12, 18, 12), LANDU
      WRITE(6, 1000) LUSE(LOT, IPCH)
 1000 FORMAT(1X, 'ERROR: LAND USE CODE', I5, 2X,
     1 'NOT RECOGNIZED IN USETOT')
      CALL SYSTEM
    1 CONTINUE
```

```
      C     FOR VIRGIN (USE=1)
            LUMAXR(LOT, IPCH) = 1
            GO TO 500
          2 CONTINUE
      C     FOR BARE, WEEDS OR SECOND GROWTH (USES 2, 3 OR 4)
            IF (LASTUS(LOT, IPCH) .NE. 2) ITEM(1) = 6
            GO TO 501
          5 CONTINUE
      C     FOR RICE ALONE (USE=5)
            ITEM(IDAGYR(15, 9)) = 2
            ITEM(IDAGYR(15, 1)) = 3
            ITEM(IDAGYR(1, 6)) = 2
            GO TO 501
          6 CONTINUE
      C     FOR RICE WITH MAIZE (USE=6)
            ITEM(IDAGYR(15, 9)) = 2
            ITEM(IDAGYR(15,12)) = 3
            ITEM(IDAGYR(1, 6)) = 2
            GO TO 501
          7 CONTINUE
      C     FOR MAIZE ALONE (USE=7)
            ITEM(IDAGYR(15, 9)) = 2
            ITEM(IDAGYR(15,12)) = 3
            ITEM(IDAGYR(15, 3)) = 2
            ITEM(IDAGYR(15, 5)) = 6
            GO TO 501
          8 CONTINUE
      C     FOR PHASEOLUS (USE=8)
            ITEM(IDAGYR(15, 9)) = 2
            ITEM(IDAGYR(15,11)) = 6
            ITEM(IDAGYR(15, 5)) = 3
            GO TO 501
          9 CONTINUE
      C     FOR PHASEOLUS AND GREEN MAIZE (USE=9)
            ITEM(IDAGYR(15, 9))  = 2
            ITEM(IDAGYR(15,12)) = 3
            GO TO 501
         10 CONTINUE
      C     FOR VIGNA (USE=10)
            ITEM(IDAGYR(15, 9)) = 2
            ITEM(IDAGYR(15,11)) = 6
            ITEM(IDAGYR(15, 4)) = 3
            GO TO 501
         11 CONTINUE
      C     FOR VIGNA AND GREEN MAIZE (USE=11)
            ITEM(IDAGYR(15, 9)) = 2
            ITEM(IDAGYR(15,12)) = 3
            GO TO 501
         12 CONTINUE
      C     FOR BITTER MANIOC (USE=12), RICE + BM (USE=13), MAIZE+BM(USE=14),
      C     RI-MZ-BM(USE=15), SWEET MANIOC(USE=16), RI-SM(USE=22) AND SM-MZ
      C     (USE=24)
            IF (IPVLU .GE. 12 .AND. IPVLU .LE. 17) GO TO 501
            IF (IPVLU .EQ. 22 .OR. IPVLU .EQ. 24) GO TO 501
            ITEM(IDAGYR(15, 9)) = 2
            ITEM(IDAGYR(1, 1)) = 3
            GO TO 501
         18 CONTINUE
      C     FOR PASTURE WITH ANIMALS (USE=23) AND PASTURE WITHOUT ANIMALS
      C     (USE=18)
```

```
121           ITEM(1) = 5
122           GO TO 501
123        19 CONTINUE
124     C     FOR RICE WITH PASTURE (USE=19)
125           ITEM(IDAGYR(15, 9)) = 2
126           ITEM(IDAGYR(15, 1)) = 3
127           ITEM(IDAGYR(15, 6)) = 5
128           GO TO 501
129        20 CONTINUE
130     C     FOR CACAO (USE=20)
131           IF (IPVLU .EQ. 20) GO TO 501
132           ITEM(IDAGYR(15, 9)) = 2
133           ITEM(IDAGYR(15, 1)) = 4
134           GO TO 501
135        21 CONTINUE
136     C     FOR PEPPER (USE=21)
137           IF (IPVLU .EQ. 21) GO TO 501
138           ITEM(IDAGYR(15, 9)) = 2
139           ITEM(IDAGYR(15, 1)) = 4
140       501 CONTINUE
141           LU = LASTUS(LOT, IPCH)
142           NODIYR = 365
143           IF (MOD(IYR, 4) .EQ. 0) NODIYR = 366
144           DO 102 ID= 1, NODIYR
145     C     SAVE PREVIOUS "LU" (LAST ITEM CHANGE)
146           LUPREV = LU
147           IF (ITEM(ID) .GE. 2) LU = ITEM(ID)
148     C     IDUR RESET TO ZERO IF PATCH IS BARE EVEN FOR A DAY
149           IF (LU .NE. LUPREV) IDUR(LOT, IPCH) = 0
150           IDUR(LOT, IPCH) = IDUR(LOT, IPCH) + 1
151     C     UPDATING OF CONTINUOUS CULTIVATION DAY COUNTER FOR PATCH.  NOTE THAT
152     C     "CULTIVATION" INCLUDES BARE, WEEDS AND PASTURE AS WELL AS ANNUAL AND
153     C     PERENNIAL CROPS.  "CONTIN" WILL BE UPDATED TO LAST DAY OF THE AGRIC.
154     C     YEAR.
155           IF (LU .EQ. 1)  GO TO 650
156           IF (LU .GE. 2 .AND. LU .LE. 5) GO TO 651
157     C     WEEDS (AGE < 240 DAYS) INCLUDED AS "CULTIVATED"
158     C     FOR CONTIN
159           IF (IDUR(LOT, IPCH) .GE. 240) GO TO 650
160       651 CONTIN(LOT, IPCH) = CONTIN(LOT, IPCH) + 1.
161           GO TO 652
162       650 CONTIN(LOT, IPCH) = 0.
163       652 CONTINUE
164     C     BARE - WEEDS DEFAULT TRANSITION
165           IF (LU .EQ. 2 .AND. IDUR(LOT, IPCH) .GE. 60) LU = 6
166           IF (ID .EQ. MRAIND) GO TO 103
167           IF (LU.EQ. 1) GO TO 102
168           GO TO 104
169       103 CONTINUE
170     C     ASSIGNMENT OF LAND USE AT TIME OF MAXIMUM RAINFALL IN 24 HOURS
171     C     "LUMAXR" CODES (DIFFERENT FROM BOTH "LUSE" CODES AND "ITEM" CODES)
172     C     ARE: 1=VIRGIN  2=ANNUAL OR BARE  3=PEPPER  4=CACAO  5=PASTURE
173     C     6=WEEDS  7=SECOND GROWTH
174           IF (LU .EQ. 1) LUMAXR(LOT, IPCH) = 1
175           IF (LU .EQ. 2) LUMAXR(LOT, IPCH) = 2
176           IF (LU .EQ. 3) LUMAXR(LOT, IPCH) = 2
177           IF (LU .EQ. 4 .AND.LUSE(LOT,IPCH).EQ.20) LUMAXR(LOT,IPCH)=4
178           IF (LU .EQ. 4 .AND.LUSE(LOT,IPCH).EQ.21) LUMAXR(LOT,IPCH)=3
179           IF (LU .EQ. 5) LUMAXR(LOT, IPCH) = 5
180           IF (LU .EQ. 6) LUMAXR(LOT, IPCH) = 6
```

```
  181           IF (LU .EQ. 6 .AND. IDUR(LOT,IPCH) .GE. 240)LUMAXB(LOT,IPCH)
  182          1 = 7
  183       104 CONTINUE
  184           GO TO(102, 600, 601, 602, 603, 604), LU
  185           WRITE (6, 2000) LU
  186      2000 FORMAT(1X, 'ERROR: LAND USE ITEM CODE (UTCOM CODE)', I4, 2X,
  187          1 'NOT RECOGNIZED IN USETOT')
  188           CALL SYSTEM
  189       600 CONTINUE
  190           DAYSBA(LOT, IPCH) = DAYSBA(LOT, IPCH) + 1.
  191           GO TO 102
  192       601 DAYSAC(LOT, IPCH) = DAYSAC(LOT, IPCH) + 1.
  193           GO TO 102
  194       602 DAYSTC(LOT, IPCH) = DAYSTC(LOT, IPCH) + 1.
  195           GO TO 102
  196       603 DAYSPA(LOT, IPCH) = DAYSPA(LOT, IPCH) + 1.
  197           GO TO 102
  198       604 DAYSFA(LOT, IPCH) = DAYSFA(LOT, IPCH) + 1.
  199       102 CONTINUE
  200     C     SAVING OF "UTCOM CODE" OR "ITEM CODE" OF LAST DAY OF AGRIC. YEAR
  201           LASTUS(LOT, IPCH) = LU
  202       500 CONTINUE
  203           RETURN
  204           END
END OF FILE
```

```
      SUBROUTINE VBQ(LOT, IPCH)
C     VIRGIN BURN QUALITY SUBROUTINE
      INTEGER BUQUAL, BUTYP
      DOUBLE PRECISION BRAND
      COMMON/DATE/ IYR
      COMMON/BQCALL/ LLOTV, LYRV, LLOTSG, LYRSG, LLOTW, LYRW
      COMMON/RANDOM/ INIT
      COMMON/BURNS/ BUTYP(1, 9), BUQUAL(1, 9)
      COMMON/WEATOT/ RAINSU, EVAPSU, RINSSU
      EXTERNAL IDAGYR, ARAND, BRAND
C     FOLLOWING ASSIGNS ONLY THE BURN QUALITY OF THE FIRST PATCH BURNED
C     FOR A GIVEN LOT IN A GIVEN YEAR TO ALL VIRGIN PATCHES BURNED IN
      IF (IYR .NE. LYRV) GO TO 200
      IF (LOT .EQ. LLOTV) GO TO 201
      LLOTV = LOT
      GO TO 200
  201 BUQUAL(LOT, IPCH) = LSTVBQ
      GO TO 102
  200 CONTINUE
      LLOTV = LOT
C     ASSIGNMENT OF CALENDAR MONTH OF FELLING
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.003) MOFELL = 5
      IF (XRAN .GE. 0.003 .AND. XRAN .LT. 0.009) MOFELL = 6
      IF (XRAN .GE. 0.009 .AND. XRAN .LT. 0.053) MOFELL = 7
      IF (XRAN .GE. 0.053 .AND. XRAN .LT. 0.138) MOFELL = 8
      IF (XRAN .GE. 0.138 .AND. XRAN .LT. 0.633) MOFELL = 9
      IF (XRAN .GE. 0.633 .AND. XRAN .LT. 0.859) MOFELL = 10
      IF (XRAN .GE. 0.859 .AND. XRAN .LT. 0.961) MOFELL = 11
      IF (XRAN .GE. 0.961) MOFELL = 12
      XRAN = ARAND(INIT, -1.)
      IFELDM = INT(XRAN * 30.)
      IFELDY = IDAGYR(IFELDM, MOFELL)
C     ASSIGNMENT OF DAYS BETWEEN FELLING AND BURNING
      DBFB = SNGL(BRAND(5.5D1, 4.4D1))
      IDBFB = IFIX(DBFB)
      IF (IDBFB .LT. 1) IDBFB = 1
C     CALCULATION OF BURNING DAY OF YEAR
      IBUDYR = IFELDY + IDBFB
C     CALCULATION OF WEATHER BETWEEN FELLING AND BURNING
      CALL WEABD(IFELDY, IBUDYR)
      RAINFB = RAINSU
      EVAPFB = EVAPSU
      RINSFB = RINSSU
C     CALCULATION OF WEATHER IN FIFTEEN DAYS PRIOR TO BURN
      I15DPB= IBUDYR - 15
      CALL WEABD(I15DPB, IBUDYR)
      RAIN15 = RAINSU
      EVAP15 = EVAPSU
      RINS15 = RINSSU
C     CALCULATION OF GOOD BURN DISCRIMINANT FUNCTION
      GOOD = 1.27E-3 * RAINFB - 5.27E-5 * EVAPFB + 2.58E-2 * RINSFB
     1 + 8.86E-2 * RAIN15 + 0.183 * EVAP15 + 3.16E-2 * RINS15 - 7.575
C     CALCULATION OF BAD BURN DISCRIMINANT FUNCTION
      BAD = 3.25E-3 * RAINFB - 3.59E-3 * EVAPFB + 3.49E-3 * RINSFB
     1 + 7.69E-2 * RAIN15 + 0.158 * EVAP15 + 3.84 * RINS15 - 6.162
C     BURN QUALITY DECISION
      IF (GOOD .GT. BAD) GO TO 100
      GO TO 101
  100 CONTINUE
```

```
      C     FOR CASES WITH GOOD BURN PREDICTED BY DISCRIMINANT FUNCTION
            XRAN = ARAND(INIT, -1.)
            BUQUAL(LOT, IPCH) = 1
            IF (XRAN .LT. 0.734) BUQUAL(LOT, IPCH) = 2
            GO TO 102
        101 CONTINUE
      C     FOR CASES WITH BAD BURN PREDICTED BY DISCRIMINANT FUNCTION
            XRAN = ARAND(INIT, -1.)
            BUQUAL(LOT, IPCH) = 1
            IF (XRAN .LT. 0.167) BUQUAL(LOT, IPCH) = 2
        102 CONTINUE
            LSTVBQ = BUQUAL(LOT, IPCH)
      C     LAST YEAR INDICATOR FOR VIRGIN BURN SET
            LYRV = IYR
            BUTYP(LOT, IPCH) = 1
            RETURN
            END
END OF FILE
```

```
      1            SUBROUTINE VBUEFF(LOT, IPCH)
      2      C     VIRGIN BURN EFFECTS SUBROUTINE
      3            INTEGER BUQUAL, BUTYP
      4            DOUBLE PRECISION BRAND
      5            DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE, PHCH,
      6           1 ALCH, PCH, RNCH, UBPHCH, UBALCH, UBPCH, UBNCH, PCHME, RNCHME,
      7           2 PHCHME, ALCHME, VBQDUM, PHBEFF, ALBEFF, CBEFF, RNBEFF, PBEFF
      8            COMMON/BUCHNG/ PHCH, ALCH, PCH, RNCH
      9            COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9), NITRO(1,
     10           1 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
     11            COMMON/EROCOM/ EROS
     12            COMMON/BURNS/ BUTYP(1, 9), BUQUAL(1, 9)
     13            COMMON/UBCHNG/ UBPHCH, UBALCH, UBPCH, UBNCH
     14            COMMON/BEFORE/ PHBEFF, ALBEFF, CBEFF, RNBEFF, PBEFF
     15            EXTERNAL BRAND
     16      C     VIRGIN BURN QUALITY DUMMY VARIABLE ASSIGNMENT
     17            VBQDUM = -1.
     18            IF (BUQUAL(LOT, IPCH) .LE. 1) VBQDUM = 1.
     19      C     PHOSPHORUS CHANGE CALCULATION
     20            PCHME = 0.677 * UBPCH - 0.357 * VBQDUM - 0.778
     21            PCH = BRAND(3.26D0, PCHME)
     22      C     NITROGEN CHANGE CALCULATION
     23            RNCHME = 4.89D-2 * CBEFF - 0.654 * RNBEFF + 2.63D-2 * PHBEFF
     24           1 - 5.80D-2
     25            RNCH = BRAND(5.38D-2, RNCHME)
     26      C     PH CHANGE CALCULATION
     27            IF (PHBEFF .LT. 4.) GO TO 110
     28            IF (PHBEFF .GE. 4. .AND. PHBEFF .LT. 5.) GO TO 111
     29            GO TO 112
     30        110 CONTINUE
     31      C     FOR BEFORE FIELD PH LESS THAN 4.0
     32            PHCHME = 1.54 - 2.30 * ALBEFF - 0.266 * VBQDUM
     33            PHCH = BRAND(6.09D-1, PHCHME)
     34            GO TO 113
     35        111 CONTINUE
     36      C     FOR BEFORE FIELD PH 4.0 - 4.9
     37            PHCHME = 1.89 - 3.11D-2 * CLAY(LOT, IPCH) - 6.68D-2 * EROS
     38            PHCH = BRAND(7.14D-1, PHCHME)
     39            GO TO 113
     40        112 CONTINUE
     41      C     FOR BEFORE FIELD PH 5.0 OR GREATER
     42            PHCHME = 5.21 - 0.180 * VBQDUM
     43            PHCH = BRAND(7.17D-1, PHCHME)
     44        113 CONTINUE
     45      C     ALUMINUM CHANGE CALCULATION
     46            ALCHME = 0.295 - 0.222 * ALBEFF + 0.224 * VBQDUM
     47            ALCH = BRAND(1.49D0, ALCHME)
     48            RETURN
     49            END
END OF FILE
```

```
      SUBROUTINE VIYLD(LOT, IPCH)
C     VIGNA YIELD SUBROUTINE
      DOUBLE PRECISION BRAND
      DOUBLE PRECISION PHOS, PH, AL, NITRO, CARB, CLAY, SLOPE,
     1 PRYLME, PRYL, PHADJ
      COMMON/SOIL/ PHOS(1, 9), PH(1, 9), AL(1, 9),
     1 NITRO(1, 9), CARB(1, 9), CLAY(1, 9), SLOPE(1, 9)
      COMMON/TECHN/ TECH(9), START(9)
      COMMON/USECOM/ LUSE(1, 9), IDUB(1, 9), LASTUS(1, 9),
     1 CONTIN(1, 9)
      COMMON/RANDOM/ INIT
      COMMON/YIELDS/ YLDRI, YLDMZ, YLDPS, YLDVI, YLDBN, YLDSN, YLDPE,
     1 YLDCA, YLDPA
      EXTERNAL ARAND, BRAND
C     INITIALIZATION OF DISEASE AND RABBITS MULTIPLIERS
      DISMUL = 1.0
      RABMUL = 1.0
C     SEED PLANTING DENSITY (KG SEEDS / HA) ASSIGNMENT
      SEEDDE = SNGL(BRAND(7.82D0, 8.10D0))
      PHADJ = PH(LOT, IPCH)
      IF(PHADJ .GE. 6.0) PHADJ = 6.0
      IF (SEEDDE .LE. 0.) SEEDDE = 0.
C     CALCULATION OF REGRESSION PREDICTED YIELD (KG / KG SEED SOWN)
      PRYLME = 20.81 * PHADJ - 84.40
      PRYL = BRAND(1.39D1, PRYLME)
      IF (PRYL .LE. 0.) PRYL = 0.
C     DISEASE DECISION
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.143) DISMUL = 0.09
C     SEVERE RABBIT ATTACK (INTENSITY 3 OR 4) DECISION
      XRAN = ARAND(INIT, -1.)
      IF (XRAN .LT. 0.176) RABMUL = 0.68
C     VIGNA YIELD CALCULATION (KG / HA)
      YLDVI = PRYL * SEEDDE * DISMUL * RABMUL
C     ADJUSTMENT FOR TECHNOLOGICAL IMPROVEMENT
      YLDVI = YLDVI * TECH(4)
      IF (YLDVI .LT. 0.0) YLDVI = 0.0
      RETURN
      END
END OF FILE
```

```
      1            SUBROUTINE WBUEFF(LOT, IPCH)
      2      C     WEED BURN EFFECTS SUBROUTINE
      3            INTEGER BUQUAL, BUTYP
      4            DOUBLE PRECISION BRAND
      5            DOUBLE PRECISION UBPHCH, UBPCH, UBALCH, UBNCH,  PHCH, ALCH,
      6           1 PHBEFF, PBEFF, ALBEFF, BUNEFF, WBQDUM, PHCHME, PCHME, ALCHME,
      7           1 PCH, BNCH, CBEFF, RNBEFF, PBEFF
      8            COMMON/BURNS/ BUTYP(10, 100), BUQUAL(10, 100)
      9            COMMON/BUCHNG/ PHCH, ALCH, PCH, RNCH
     10            COMMON/UBCHNG/ UBPHCH, UBALCH, UBPCH, UBNCH
     11            COMMON/BEFORE/ PHBEFF, ALBEFF, CBEFF, RNBEFF, PBEFF
     12            EXTERNAL BRAND
     13      C     WEED BURN QUALITY DUMMY VARIABLE ASSIGNMENT
     14            WBQDUM = -1.
     15            IF (BUQUAL(LOT, IPCH) .LE. 1) WBQDUM = 1.
     16      C     ALUMINUM CHANGE CALCULATION
     17            ALCH = 0.
     18            IF (ALBEFF .LT. 0.001) GO TO 100
     19            ALCHME = 0.550 - 0.392 * ALBEFF
     20            ALCH = BRAND(1.85D0, ALCHME)
     21        100 CONTINUE
     22      C     PH CHANGE CALCULATION
     23            PHCHME = 3.37 - 0.302 * ALBEFF - 0.187 * ALCH - 0.455 * PHBEFF
     24            PHCH = BRAND(7.25D-1, PHCHME)
     25      C     PHOSPHORUS CHANGE CALCULATION
     26            PCHME  = 1.00 * UBPCH - 0.709 * WBQDUM - 1.46
     27            PCH = BRAND(3.56D0, PCHME)
     28      C     NITROGEN CHANGE CALCULATION
     29            BUNEFF = BRAND(5.8D-2, -3.3D-2)
     30            RNCH = UBNCH +BUNEFF
     31            RETURN
     32            END
END OF FILE
```

```
      1            SUBROUTINE WEABD(IBEG, IEND)
      2      C     WEATHER BETWEEN DATES SUBROUTINE. ARGUMENTS IBEG AND IEND ARE
      3      C     BEGINNING AND ENDING DAYS OF AGRICULTURAL (JULY - JUNE) YEAR.
      4            COMMON/WEATOT/ RAINSU, EVAPSU, RINSSU
      5            COMMON/WEACOM/ RAIN(366), EVAP(366), RINSOL(366)
      6            RAINSU = 0.
      7            EVAPSU = 0.
      8            RINSSU = 0.
      9            DO 100 IAGDA=1,366
     10            ICALDA = IAGDA + 181
     11            IF (IAGDA .GT. 184) ICALDA = IAGDA - 182
     12            IF (IAGDA .GE. IEND) GO TO 103
     13            IF (IAGDA .GE. IBEG) GO TO 102
     14            GO TO 100
     15        102 RAINSU = RAINSU + RAIN(ICALDA)
     16            EVAPSU = EVAPSU + EVAP(ICALDA)
     17            RINSSU = RINSSU + RINSOL(ICALDA)
     18        100 CONTINUE
     19        103 CONTINUE
     20            RETURN
     21            END
END OF FILE
```

```
      SUBROUTINE WEAGEN
C     WEATHER GENERATION SUBROUTINE
      REAL MORAIN, MOEVAP, MOINSO
      DOUBLE PRECISION BRAND
      DIMENSION MORAIN(12), MOEVAP(12), MOINSO(12)
      COMMON/WEACOM/ RAIN(366), EVAP(366), RINSOL(366)
      COMMON/MOWEA/ SDRAIN(12), SDEVAP(12), SDINSO(12)
      EXTERNAL NODIM, BRAND
C     PLANTING SEASON RAIN (JAN - MAY) ASSIGNMENT
      PLRAIN = SNGL(BRAND(3.009D2, 1.3962D3))
      IF (PLRAIN .LE. 0.) PLRAIN = 0.
      MORAIN(1) = PLRAIN * SNGL(BRAND(5.9D-2, 1.78D-1))
      MORAIN(2) = PLRAIN * SNGL(BRAND(3.8D-2, 2.14D-1))
      MORAIN(3) = PLRAIN * SNGL(BRAND(5.0D-2, 2.63D-1))
      MORAIN(4) = PLRAIN * SNGL(BRAND(5.0D-2, 2.14D-1))
      MORAIN(5) = PLRAIN * SNGL(BRAND(5.2D-2, 1.31D-1))
C     MONTHLY RAINFALLS (JUNE - AUGUST)
      MORAIN(6) = SNGL(BRAND(4.82D1, 7.75D1))
      MORAIN(7) = SNGL(BRAND(5.07D1, 5.88D1))
      MORAIN(8) = SNGL(BRAND(2.24D1, 2.81D1))
C     RAIN IN BURNING SEASON (SEPT - DEC)
      BURAIN = SNGL(BRAND(1.481D2, 2.817D2))
      IF (BURAIN .LE. 0.) BURAIN = 0.
      MORAIN(9) = BURAIN * SNGL(BRAND(1.09D-1, 1.86D-1))
      MORAIN(10)= BURAIN * SNGL(BRAND(1.07D-1, 1.99D-1))
      MORAIN(11)= BURAIN * SNGL(BRAND(1.38D-1, 1.85D-1))
      MORAIN(12)= BURAIN * SNGL(BRAND(1.03D-1, 4.29D-1))
      IDAYR = 0
      DO 100 MO = 1, 12
      IF (MORAIN(MO) .LE. 0.) MORAIN(MO) = 0.
C     MONTHLY EVAPORATION ASSIGNMENT
      EVMEAN = 102.0 - 0.150 * MORAIN(MO)
      MOEVAP(MO) = SNGL(BRAND(3.21D1, DBLE(EVMEAN)))
C     MONTHLY INSOLATION ASSIGNMENT
      RINSME = 156.7 - 0.180 * MORAIN(MO)
      MOINSO(MO) = SNGL(BRAND(4.41D1, DBLE(RINSME)))
      MODAYS = NODIM(MO, 1)
      PRMOTO = 1. / FLOAT(MODAYS)
      IF (MOEVAP(MO) .LE. 0.) MOEVAP(MO) = 0.
      IF (MOINSO(MO) .LE. 0.) MOINSO(MO) = 0.
      DO 101 IDAY = 1, MODAYS
      IDAYR = IDAYR + 1
C     ASSIGNMENT OF RAIN, EVAPORATION AND INSOLATION FOR DAY OF YEAR
      RAIN(IDAYR) = MORAIN(MO) * SNGL(BRAND(DBLE(SDRAIN(MO)),
     1 DBLE(PRMOTO)))
      EVAP(IDAYR) = MOEVAP(MO) * SNGL(BRAND(DBLE(SDEVAP(MO)),
     1 DBLE(PRMOTO)))
      RINSOL(IDAYR) = MOINSO(MO) * SNGL(BRAND(DBLE(SDINSO(MO)),
     1 DBLE(PRMOTO)))
      IF (RAIN(IDAYR) .LE. 0.) RAIN(IDAYR) = 0.
      IF (EVAP(IDAYR) .LE. 0.) EVAP(IDAYR) = 0.
      IF (RINSOL(IDAYR) .LE. 0.) RINSOL(IDAYR) = 0.
  101 CONTINUE
  100 CONTINUE
      RETURN
      END
END OF FILE
```

```
 1      0.00  0.33  0.00  0.33  0.33  0.00  0.00
 2      0.09  0.73  0.09  0.00  0.00  0.00  0.09
 3      0.00  0.17  0.33  0.00  0.50  0.00  0.00
 4      0.09  0.00  0.00  0.36  0.36  0.18  0.00
 5      0.11  0.00  0.33  0.44  0.00  0.11  0.00
 6      0.00  0.00  0.00  0.40  0.20  0.40  0.00
 7      0.00  1.00  0.00  0.00  0.00  0.00  0.00
 8      0.40  0.43  0.09  0.06  0.00  0.00  0.03
 9      0.25  0.43  0.15  0.08  0.08  0.02  0.00
10      0.12  0.36  0.24  0.08  0.12  0.08  0.00
11      0.12  0.29  0.12  0.24  0.24  0.00  0.00
12      0.00  0.25  0.15  0.20  0.30  0.10  0.00
13      0.00  0.20  0.40  0.00  0.40  0.00  0.00
14      1.00  0.00  0.00  0.00  0.00  0.00  0.00
15    0.43 0.41 0.07 0.01 0.01 0.03 0.04 PBI PRIMZ PRIBM PRISM PRIMZS PRIPA PRIMZB
16    0.90 (0.10) PRES (PRGMZPS)
17    0.32 (0.68) PRVI (PRMZVI)
18    0.62 0.00 0.08 (0.30) PRBM PREMBI PREMMZ (PRBMBIMZ)
19    0.91 0.04 0.00 (0.09) PRSE PRSEBI PESMMZ (PRBIMZSM)
20    0.66 0.09 0.07 0.00 0.07 0.01 0.00 0.00 0.10 0.00      ANNUAL CROP STRATEGY
21    0.54 0.16 0.02 0.00 0.06 0.00 0.07 0.03 0.12 0.00    TREE CROPS STRATEGY
22    0.35 0.03 0.05 0.00 0.05 0.00 0.00 0.00 0.40 0.12  RANCHING STRATEGY
23    0.83 0.00 0.17 0.00 0.00 0.00 0.00 0.00 0.00 0.00    OUTSIDE LABOR STRATEGY
24    0.03 0.00    PCAGPE  PPEGCA
25      0.0   0.0   0.0   0.0   0.0   0.0   6.9   6.9   6.9   8.0   0.0   0.0 VIRGIN
26      0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0  10.0  10.0   4.8   0.0 SEC.GTH
27      0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   7.0   1.7   0.0 WEEDS
28      6.3   3.7   3.7   0.0   0.0  14.1   4.1   0.0   0.0   0.0   0.0   0.0  RICE
29      0.0   4.7   4.7   0.0   0.0   0.0   0.0   5.0   5.0   0.0   0.0   2.0  MAIZE
30      0.0   0.0   0.0  13.4   0.0   6.2  11.2   0.0   0.0   0.0   0.0   0.0  BEANS
31      0.0  20.3  20.3  20.3  20.3   0.0   0.0   0.0   0.0   0.0  20.3  20.3 MANIOC
32     20.0   0.0   0.0   0.0   0.0   0.0   0.0  15.0   6.0   0.0  22.0  22.0  CACAO
33     27.0  13.5   1.5   4.5  12.0   0.0  46.3  46.3  10.0  30.0  24.0   0.0 PEPPER
34      2.3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   3.0   0.0   0.0 PA W/A
35      0.0   0.0   0.0   0.0   0.0   0.0   4.7   4.7   0.0   0.0   0.0   0.0 PA WO A
36      9.0   9.0   9.0   9.0   9.0   9.0   9.0   9.0   9.0   9.0   9.0   9.0 CA MT
37      1.5   9.0   2.5   1.5   0.0  11.5   1.5   9.0   2.5   0.0   9.0   2.5 PE MT
38      0.0   0.0   0.0   0.0   0.0   0.0   1.0   1.0   0.0   0.0   0.0   0.0 PAWOA M
39      0.6   0.6   0.6   0.6   0.6   0.6   4.1   4.1   0.6   0.6   0.6   0.6 PAWA MT
40      0.0   0.0   0.0   0.0   0.0   0.0   6.9   6.9   8.0   0.0   0.0   0.0 VIRGIN
41      0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0  10.0  10.0   4.8   0.0 SEC GTH
42      0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   7.0   1.7   0.0 WEEDS
43      2.5   0.0   0.0   0.0   0.0  14.1   4.1   0.0   0.0   0.0   0.0   0.0 RICE
44      0.0   0.0   0.0   0.0   0.0   0.0   0.0   2.5   2.5   0.0   2.0   0.0 MAIZE
45      0.0   0.0   0.0  13.4   0.0   0.0   5.0   0.0   0.0   0.0   0.0   0.0 BEANS
46      0.0  10.8  10.8  10.8  10.8   0.0   0.0   0.0   0.0   0.0  10.8  10.8 MANIOC
47     20.0   0.0   0.0   0.0   0.0   0.0   0.0   9.0   6.0   0.0  22.0  22.0 CACAO
48     27.0   0.0   1.5   0.0   0.0   0.0  46.3  46.3  10.0  30.0  24.0   0.0 PEPPER
49      2.3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 PA WO A
50      0.0   0.0   0.0   0.0   0.0   0.0   4.7   4.7   0.0   0.0   0.0   0.0 PA W/AN
51      5.5   5.5   5.5   5.5   5.5   5.5   5.5   5.5   5.5   5.5   5.5   5.5 CAC MT
52      1.5   0.0   0.0   1.5   0.0  10.0   1.5   0.0   0.0   0.0   0.0   0.0 PEP MT
53      0.0   0.0   0.0   0.0   0.0   0.0   1.0   1.0   0.0   0.0   0.0   0.0 PAWOA M
54      0.6   0.6   0.6   0.6   0.6   0.6   0.6   0.6   0.6   0.6   0.6   0.6 PAWA MT
55        0     0     0     0     0     0     0     0     0     0     0     0 VIRGIN
56        0     0     0     0     0     0     0     0     0     0     0     0 SEC GTH
57        0     0     0     0     0     0     0     0     0     0     0     0 WEEDS
58        0     0     0     0     0    18     0     0     0     0     0     0 RICE
59        0     0     0     0     0     0     0     0     0     0     0    10 MAIZE
60        0     0     0     8     0     0     0     0     0     0     0     0 BEANS
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 61        30     30     30     30     30     30     30     30     30     30     30     30 MANIOC
 62       726      0      0      0      0      0      0      0      0      0      0      0 CACAO
 63      1638      0      0      0      0      0      0      0      0      0      0      0  PEPPER
 64         0      0      0      0      0      0      0      0      0      0      0      0 PAWO AN
 65       688      0      0      0      0      0      0      0      0      0      0      0 PAW/AN
 66        62      0      0      0      0      0      0      0      0      0      0      0 CAC MT
 67       620      0      0      0      0      0      0      0      0      0      0      0 PEP MT
 68       935      0      0      0      0      0      0      0      0      0      0      0 PAWOA MT
 69         0      0      0      0      0      0      0    200    100      0      0      0 PAWA MT
 70      6.0 6.0 1 20  346273  1  0  1999  LAND AND HOUSE
 71      7.012.0 1  8  3 1037  6  0  1  3  VIRGIN FELLING W/ 8 YR PERIOD
 72     10.013.0 1  1  0  450  6  0  4999  VIRGIN FELLING WITH 1 YR PERIOD
 73      6.0 6.0 1  4  1 7744  1  0  1999  INCRA DEBT FOR NONDURABLES
 74      7.0 2.0 1  8  3 7588  1  0  1999  OTHER DEBT FOR DURABLES
 75      6.0 6.0 1  1  0  202  3  0  1  4  INCRA SEEDS
 76     10.013.0 1  1  0  430  3  0  1999  RICE CUSTEIO
 77     10.013.0 1  1  0  190  3  0  1  3  MAIZE CUSTEIO
 78     10.013.0 1  1  0  340  2  0  1  3  PHASEOLUS CUSTEIO
 79     10.013.0 1  8  3 8748  2  0  1999  PEPPER OR CACAO
 80     10.013.0 1  8  3 1156  5  0  1999  PASTURE WITH ANIMALS
 81      0.0 0.0 1  1  0 1000  1  0  1999  PRIVATE
 82     0.350 20   RAINFL  MAXNLC
 83      1.00 0.79 0.74 1.00 0.12 1.00 0.73 0.67 0.57 0.50 0.05 0.10  PRFIN
 84      0.18 0.18 0.25 0.10 0.17   RICE
 85      0.28 0.28 0.29 0.00 0.00     MAIZE
 86      0.06 0.05 0.09 0.00 0.00   PHASEOLUS
 87      0.00 0.00 0.00 0.00 0.00  VIGNA
 88      0.00 0.00 0.00 0.00 0.00   BITTER MANIOC
 89      0.00 0.00 0.00 0.00 0.00  SWEET MANIOC
 90      0.00 0.00 0.00 0.00 0.00  CACAO
 91      0.00 0.00 0.00 0.00 0.00  PEPPER
 92      0.00 0.00 0.00 0.00 0.00    PASTURE WITHOUT ANIMALS
 93      0.00 0.00 0.00 0.00 0.00    PASTURE WITH ANIMALS
 94      0.07   15 -0.68 14.13 -2.00 84.00  EHUNT IENDHU YLDSLO YLDINT EFFSLO EFFINT
 95      0.026 0.082 0.084 0.148 0.104 0.108 0.124 0.136 0.016 0.014 0.072 0.086 EFFORT
 96      0.40   GWASTE
 97      0.00 0.00 0.16 0.00 1.00 0.23  4 0.26 0.40 0.34
 98      0.21 0.29 0.03 0.13 0.11 0.29 999 999 999 0.21 0.29 0.00 0.45 0.50 0.50
 99       37.03  37.03  OWNER AGE MEAN
100       10.78  10.78  OWNER AGE SD
101      0.9120 0.9470  PROB OTHER DEPENDENTS IF MARRIED
102      0.1820 0.0000  PROB OTHER DEPENDENTS IF SINGLE
103      0.8980 0.9500  PROB WIFE
104       31.87  31.87  WIFE AGE MEAN
105       10.67  10.67  WIFE AGE STANDARD DEVIATION
106        0.53   0.53  PROB OTHER DEPENDENT IS MALE
107        4.14   4.14  NO OTHER DEPENDENTS MEAN
108        2.27   2.27  NO OTHER DEPENDENTS SD
109        33.3  23.1  86.7  79.0  45.0  30.0                COLONIST DISEASES
110      0.0227 0.0185 0.0103 0.0214 0.0198 0.0138 0.0175  MALES MALARIA
111      0.0130 0.0144 0.0072 0.0248 0.0165              MALES MALARIA
112      0.0140 0.0098 0.0038 0.0090 0.0116 0.0191 0.0176  FEMALES MALARIA
113      0.0196 0.0025 0.0165 0.0248 0.0062 0.0248         FEMALES MALARIA
114      0.0027 0.0021 0.0033 0.0062 0.0084 0.0053 0.0095    MALES TRAUMA
115      0.0065 0.0058 0.0046 0.0038 0.0248 0.0414           MALES TRAUMA
116      0.0016 0.0009 0.0005 0.0011 0.0011 0.0006 0.0021     FEMALES TRAUMA
117      0.0039 0.0012 0.0033 0.0000 0.0062 0.0000                FEMALES TRAUMA
118      0.0405 0.0058 0.0018 0.0021 0.0038 0.0024 0.0009  MALES OTHER DISEASE
119      0.0059 0.0023 0.0033 0.0019 0.0331 0.0083   MALES OTHER DISEASE
120      0.0260 0.0021 0.0016 0.0005 0.0011 0.0032 0.0021  FEMALES OTHER DISEASE
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121     0.0065 0.0037 0.0033 0.0000 0.0062 0.0124   FEMALES OTHER DISEASE
122     0.061 0.083 0.126 0.067 0.056 0.051    MALARIA PDISMO
123     0.067 0.104 0.155 0.092 0.081 0.057    MALARIA PDISMO
124     0.051 0.080 0.048 0.070 0.090 0.049   TRAUMA PDISMO
125     0.079 0.103 0.081 0.103 0.141 0.105   TRAUMA PDISMO
126     0.083 0.084 0.083 0.083 0.084 0.083   CTHER DISEASE PDISMO
127     0.084 0.083 0.083 0.084 0.083 0.083   OTHER DISEASE PDISMO
128     0.077 0.077     PDEP (AGE = 1)
129     0.074 0.074     PDEP (AGE = 2)
130     0.064 0.064     PDEP (AGE = 3)
131     0.065 0.065     PDEP (AGE = 4)
132     0.052 0.052     PDEP (AGE = 5)
133     0.052 0.052     PDEP (AGE = 6)
134     0.055 0.055     PDEP (AGE = 7)
135     0.036 0.036     PDEP (AGE = 8)
136     0.039 0.039     PDEP (AGE = 9)
137     0.052 0.052     PDEP (AGE = 10)
138     0.061 0.061     PDEP (AGE = 11)
139     0.055 0.055     PDEP (AGE = 12)
140     0.039 0.039     PDEP (AGE = 13)
141     0.047 0.047     PDEP (AGE = 14)
142     0.017 0.017     PDEP (AGE = 15)
143     0.025 0.025     PDEP (AGE = 16)
144     0.036 0.036     PDEP (AGE = 17)
145     0.028 0.028     PDEP (AGE = 18)
146     0.011 0.011     PDEP (AGE = 19)
147     0.022 0.022     PDEP (AGE = 20)
148     0.017 0.017     PDEP (AGE = 21)
149     0.014 0.014     PDEP (AGE = 22)
150     0.008 0.008     PDEP (AGE = 23)
151     0.014 0.014     PDEP (AGE = 24)
152     0.003 0.003     PDEP (AGE = 25)
153     0.008 0.008     PDEP (AGE = 26)
154     0.000 0.000     PDEP (AGE = 27)
155     0.000 0.000     PDEP (AGE = 28)
156     0.006 0.006     PDEP (AGE = 29)
157     0.003 0.003     PDEP (AGE = 30)
158     0.000 0.000     PDEP (AGE = 31)
159     0.000 0.000     PDEP (AGE = 32)
160     0.003 0.003     PDEP (AGE = 33)
161     0.000 0.000     PDEP (AGE = 34)
162     0.000 0.000     PDEP (AGE = 35)
163     0.000 0.000     PDEP (AGE = 36)
164     0.000 0.000     PDEP (AGE = 37)
165     0.000 0.000     PDEP (AGE = 38)
166     0.000 0.000     PDEP (AGE = 39)
167     0.000 0.000     PDEP (AGE = 40)
168     0.000 0.000     PDEP (AGE = 41)
169     0.000 0.000     PDEP AGE = 42)
170     0.000 0.000     PDEP (AGE = 43)
171     0.000 0.000     PDEP (AGE = 44)
172     0.000 0.000     PDEP (AGE = 45)
173     0.000 0.000     PDEP (AGE = 46)
174     0.000 0.000     PDEP (AGE = 47)
175     0.000 0.000     PDEP (AGE = 48)
176     0.000 0.000     PDEP (AGE = 49)
177     0.000 0.000     PDEP (AGE = 50)
178     0.000 0.000     PDEP (AGE = 51)
179     0.000 0.000     PDEP (AGE = 52)
180     0.000 0.000     PDEP (AGE = 53)
```

```
0.000 0.000     PDEP (AGE = 54)
0.000 0.000     PDEP (AGE = 55)
0.000 0.000     PDEP (AGE = 56)
0.000 0.000     PDEP (AGE = 57)
0.000 0.000     PDEP (AGE = 58)
0.000 0.000     PDEP (AGE = 59)
0.000 0.000     PDEP (AGE = 60)
0.000 0.000     PDEP (AGE = 61)
0.003 0.003     PDEP (AGE = 62)
0.000 0.000     PDEP (AGE = 63)
0.000 0.000     PDEP (AGE = 64)
0.000 0.000     PDEP (AGE = 65)
0.006 0.006     PDEP (AGE = 66)
0.000 0.000     PDEP (AGE = 67)
0.000 0.000     PDEP (AGE = 68)
0.003 0.003     PDEP (AGE = 69)
0.000 0.000     PDEP (AGE = 70)
0.000 0.000     PDEP (AGE = 71)
0.000 0.000     PDEP (AGE = 72)
0.000 0.000     PDEP (AGE = 73)
0.000 0.000     PDEP (AGE = 74)
0.000 0.000     PDEP (AGE = 75)
0.000 0.000     PDEP (AGE = 76)
0.000 0.000     PDEP (AGE = 77)
0.000 0.000     PDEP (AGE = 78)
0.000 0.000     PDEP (AGE = 79)
0.000 0.000     PDEP (AGE = 80)
0.000 0.000     PDEP (AGE = 81)
0.000 0.000     PDEP (AGE = 82)
0.000 0.000     PDEP (AGE = 83)
0.003 0.003     PDEP (AGE = 84)
0.000 0.000     PDEP (AGE = 85)
0.003 0.003     PDEP (AGE = 86)
0.00 0.20 0.25 0.50 1.00    MALES  FLEQUI
0.00 0.15 0.20 0.40 0.75  FEMALES FLEQUI
0.0156 0.0000 0.0118 0.0000    AGE CL = 1
0.0008 0.0000 0.0005 0.0000    AGE CL = 2
0.0008 0.0000 0.0005 0.0000    AGE CL = 3
0.0008 0.0000 0.0005 0.0000    AGE CL = 4
0.0008 0.0000 0.0005 0.0000    AGE CL = 5
0.0006 0.0000 0.0004 0.0000    AGE CL = 6
0.0006 0.0000 0.0004 0.0000    AGE CL = 7
0.0006 0.0000 0.0004 0.0000    AGE CL = 8
0.0006 0.0000 0.0004 0.0000    AGE CL = 9
0.0006 0.0000 0.0004 0.0000    AGE CL = 10
0.0004 0.0000 0.0003 0.0000    AGE CL = 11
0.0004 0.0000 0.0003 0.0000    AGE CL = 12
0.0004 0.0000 0.0003 0.0000    AGE CL = 13
0.0004 0.0000 0.0003 0.0000    AGE CL = 14
0.0004 0.0000 0.0003 0.0000    AGE CL = 15
0.0010 0.0000 0.0004 0.0323    AGE CL = 16
0.0010 0.0000 0.0004 0.1378    AGE CL = 17
0.0010 0.0303 0.0004 0.0345    AGE CL = 18
0.0010 0.1034 0.0004 0.0000    AGE CL = 19
0.0010 0.0625 0.0004 0.0000    AGE CL = 20
0.0011 0.0768 0.0004 0.0000    AGE CL = 21
0.0011 0.0968 0.0004 0.0714    AGE CL = 22
0.0011 0.0590 0.0004 0.0000    AGE CL = 23
0.0011 0.0385 0.0004 0.0000    AGE CL = 24
0.0011 0.0000 0.0004 0.0000    AGE CL = 25
```

```
241     0.0008 0.0000 0.0005 0.0000   AGE CL = 26
242     0.0008 0.0000 0.0005 0.0000   AGE CL = 27
243     0.0008 0.0000 0.0005 0.0000   AGE CL = 28
244     0.0008 0.0000 0.0005 0.0000   AGE CL = 29
245     0.0008 0.0000 0.0005 0.0000   AGE CL = 30
246     0.0010 0.0435 0.0010 0.0000   AGE CL = 31
247     0.0010 0.0000 0.0010 0.0435   AGE CL = 32
248     0.0010 0.0000 0.0010 0.0000   AGE CL = 33
249     0.0010 0.0000 0.0010 0.0000   AGE CL = 34
250     0.0010 0.0000 0.0010 0.0000   AGE CL = 35
251     0.0016 0.0000 0.0011 0.0000   AGE CL = 36
252     0.0016 0.0000 0.0011 0.0000   AGE CL = 37
253     0.0016 0.0000 0.0011 0.0000   AGE CL = 38
254     0.0016 0.0000 0.0011 0.0000   AGE CL = 39
255     0.0016 0.0000 0.0011 0.0000   AGE CL = 40
256     0.0026 0.0000 0.0022 0.0000   AGE CL = 41
257     0.0026 0.0000 0.0022 0.0000   AGE CL = 42
258     0.0026 0.0000 0.0022 0.0000   AGE CL = 43
259     0.0026 0.0000 0.0022 0.0000   AGE CL = 44
260     0.0026 0.0000 0.0022 0.0000   AGE CL = 45
261     0.0040 0.0000 0.0033 0.0000   AGE CL = 46
262     0.0040 0.0000 0.0033 0.0000   AGE CL = 47
263     0.0040 0.0714 0.0033 0.0000   AGE CL = 48
264     0.0040 0.0000 0.0033 0.0000   AGE CL = 49
265     0.0040 0.0909 0.0033 0.0000   AGE CL = 50
266     0.0058 0.0000 0.0041 0.0000   AGE CL = 51
267     0.0058 0.0000 0.0041 0.0000   AGE CL = 52
268     0.0058 0.0000 0.0041 0.0000   AGE CL = 53
269     0.0058 0.0000 0.0041 0.0000   AGE CL = 54
270     0.0058 0.0000 0.0041 0.0000   AGE CL = 55
271     0.0107 0.0000 0.0066 0.0000   AGE CL = 56
272     0.0107 0.0000 0.0066 0.0000   AGE CL = 57
273     0.0107 0.0000 0.0066 0.0000   AGE CL = 58
274     0.0107 0.0000 0.0066 0.0000   AGE CL = 59
275     0.0107 0.0000 0.0066 0.0000   AGE CL = 60
276     0.0186 0.0000 0.0107 0.0000   AGE CL = 61
277     0.0186 0.0000 0.0107 0.0000   AGE CL = 62
278     0.0186 0.0000 0.0107 0.0000   AGE CL = 63
279     0.0186 0.0000 0.0107 0.0000   AGE CL = 64
280     0.0186 0.0000 0.0107 0.0000   AGE CL = 65
281     0.0295 0.0000 0.0183 0.0000   AGE CL = 66
282     0.0295 0.0000 0.0183 0.0000   AGE CL = 67
283     0.0295 0.0000 0.0183 0.0000   AGE CL = 68
284     0.0295 0.0000 0.0183 0.0000   AGE CL = 69
285     0.0295 0.0000 0.0183 0.0000   AGE CL = 70
286     0.0478 0.0000 0.0346 0.0000   AGE CL = 71
287     0.0478 0.0000 0.0346 0.0000   AGE CL = 72
288     0.0478 0.0000 0.0346 0.0000   AGE CL = 73
289     0.0478 0.0000 0.0346 0.0000   AGE CL = 74
290     0.0478 0.0000 0.0346 0.0000   AGE CL = 75
291     0.0686 0.0000 0.0564 0.0000   AGE CL = 76
292     0.0686 0.0000 0.0564 0.0000   AGE CL = 77
293     0.0686 0.0000 0.0564 0.0000   AGE CL = 78
294     0.0686 0.0000 0.0564 0.0000   AGE CL = 79
295     0.0686 0.0000 0.0564 0.0000   AGE CL = 80
296     0.1175 0.0000 0.1000 0.0000   AGE CL = 81
297     0.1175 0.0000 0.1000 0.0000   AGE CL = 82
298     0.1175 0.0000 0.1000 0.0000   AGE CL = 83
299     0.1175 0.0000 0.1000 0.0000   AGE CL = 84
300     0.1175 0.0000 0.1000 0.0000   AGE CL = 85
```

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 0.1981 0.0000 0.1875 0.0000  AGE CL =  86
 0.060 0.060 0.060 0.060 0.060 0.234 0.234 0.234 0.234 0.234   PBIRTH
 0.272 0.272 0.272 0.272 0.272 0.252 0.252 0.252 0.252 0.252  PBIRTH
 0.201 0.201 0.201 0.201 0.201 0.110 0.110 0.110 0.110 0.110  PBIRTH
 2.60 2.35 2.10 1.80 1.55 1.25 1.05 1.00   CALAGE
 3.35 2.35 2.20 2.05 1.95 1.85 1.80 1.70 1.60 1.55  PROAGE
 1.50 1.45 1.40 1.33 1.23 1.15 1.12 1.08 1.00      PROAGE
 0.069  21    9 0.049 0.625   PMARRY AGERME AGBRSD PINDIM PMIMIG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.067 0.000 0.067  PRIMAG
 0.067 0.200 0.067 0.000 0.133 0.000 0.067 0.067 0.000 0.000  PRIMAG
 0.000 0.067 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.067 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.067 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000                          PRIMAG
 0.000 0.000 0.000 0.111 0.000 0.111 0.000 0.111 0.111 0.000  PRIMAG
 0.000 0.000 0.000 0.111 0.000 0.000 0.000 0.000 0.111 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.111 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.111 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.111 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000  PRIMAG
 0.000 0.000 0.000 0.000 0.000 0.000                          PRIMAG
 2550 38.0 25.0   54.40  326.40 0.50  CALMIN PROMIN ANPMIN CHPCMI CHPPMI CLLMAX
  820 1180 1355 1540 1695 1830 1955 2075 2185 2295 2400 2475 2550  CALREQ
 2625 2700 2750 2735 2720 2685 2610 2600 2470 2340 2080 1820      CALREQ
 11.9 12.3 15.4 19.2 23.1 26.2 26.2 25.4   PROREQ
2360.0 0.053 0.000  RICE WITH HUSKS
   0.0 0.000 0.000  MAIZE
3260.0 0.191 0.000  PHASEOLUS
3360.0 0.226 0.000  VIGNA
3440.0 0.136 0.000  BITTER MANIOC
3440.0 0.136 0.000  SWEET MANIOC
   0.0 0.000 0.000  CACAO
   0.0 0.000 0.000  PEPPER
1000.0 0.000 0.000  CALORIES
   0.0 1.000 0.000  TOTAL PROTEIN
   0.0 0.000 1.000  ANIMAL PROTEIN
   0.0 0.000 0.000  CATTLE
2396.0 0.189 0.189  CHICKENS
1160.0 0.210 0.210  GAME
   0.0 0.000 0.000  PIGS
4220.0 0.150 0.150  PORK
2500.0 0.210 0.210  CANNED MEAT (BEEF)
   303.0 1.00 0.63 0.49 0.49 0.49 4.84 8.68 39.72 0.14 0.54 PASTURE
 100.0   9.0  ELLIM
   25   50  100    0   10   25   DOSECA   PHOSPHORUS
   25   50  200    0   10   50   DOSECA   POTASSIUM
   10   20   50                  DOSECA   NITROGEN
    0    0    0                  DOSECA   MANEUR
   70  100  150  300   30   40   50  100  DOSEPE  PHOSPHORUS
   60   80  100  200    0    0   25   50   DOSEPE  POTASSIUM
   40   60   80  100                      DOSEPE  NITROGEN
 2222 2222 2222 2222                      MANEUR DOSEPE
   0.430   5.900   2.600   5.910   0.430      PRICFE
 0.250 0.539 0.000405 0.009 2000 0.0568 -6.41   PFERT SLOLI CONSLI ALLIME SLOPHO
  24   3 1041  148 0.11 0.00 0.00 0.00 0.11 0.08 0.08 0.29 0.11 0.11 0.11 0.00
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      0.20   DEPREC
     0.169 0.221   SMIYPR VITYPR
      15.0   15.0   15.0   15.0   15.0   20.0   15.0   20.0   20.0   15.0   15.0   15.0 COLAB
      2.44   0.84   1.25   0.24  BUYME BUYSD SELLME SELLSD  (RICE)
      0.85   0.13   0.74   0.24  BUYME BUYSD SELLME SELLSD  (MAIZE)
     10.62   4.15   3.64   1.17  BUYME BUYSD SELLME SELLSD  (PHAS.)
      8.85   3.46   3.02   0.98  BUYME BUYSD SELLME SELLSD  (VIGNA)
      2.90   0.60   1.31   0.00  BUYME BUYSD SELLME SELLSD  (BIT. MAN.)
      2.90   0.60   1.31   0.00  BUYME BUYSD SELLME SELLSD  (SWEET MAN.)
      0.00   0.00   6.00   0.00  BUYME BUYSD SELLME SELLSD  (CACAO)
      0.00   0.00   7.52   0.00  BUYME BUYSD SELLME SELLSD  (PEPPER)
      0.34   0.00   0.00   0.00  BUYME BUYSD SELLME SELLSD  (CALORIES (CR$/1000 CAL/YR))
    248.64   0.00   0.00   0.00  BUYME BUYSD SELLME SELLSD  (TOTAL PROTEIN (CR$/KG/YR))
    248.64   0.00   0.00   0.00  BUYME BUYSD SELLME SELLSD  (ANIMAL PROTEIN (CR$/G/CAP/YR))
     10.00   0.00   5.34   0.00  BUYME BUYSD SELLME SELLSD  (CATTLE)
     33.32   4.44  25.32   0.00  BUYME BUYSD SELLME SELLSD  (CHICKENS)
      9.23   2.18   9.23   2.18  BUYME BUYSD SELLME SELLSD  (GAME)
      0.00   0.00   0.00   0.00  BUYME BUYSD SELLME SELLSD  (---)
      0.00   0.00   0.00   0.00  BUYME BUYSD SELLME SELLSD  (---)
     14.93   4.53   0.00   0.00  BUYME BUYSD SELLME SELLSD  (CANNED MEAT)
      2.0   CONMAX
     0.053 17788 20344 0.011   492   121 PCRECD, CRECME, CRECSD, PCSENT, CSENME, CSENSD
     0.43 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00  PSELLB
     0.25 0.10  PRVCLF  PPLPAY
     29.6 12.6 29.2  8.1  SEED
     0.12 0.08 75.1 33.3  TRANME TRANSD BTRCME BTRCSD
     0.0744 0.581  CHICMZ  CWASTE
      176.01 1760.51TUBCAL TUBTP
     1.000 1.000 0.271  BURNER
     1636    0  36.00
     1418    0  18.00
      647    0   1.00
      647    0   1.00
     3477    0  32.89
     3477    0  32.89
     1600    0  24.00
     5500    0   0.00
       11    0   1.74
       0.02      0      0      0      0      0      0      0      0 ENTREPRENEURS ORIGINAL
       0.17   5265  11431    460   4210   1160   4210    285   1067  IND. FARMERS ORIGINAL
       0.22   1768   3186      0      0      0      0     97    456 ART. FARMERS ORIGINAL
       0.59   2360   6958      0      0      0      0      0      0  LABORERS ORIGINAL
       0.11   7849  11099      0      0      0      0      0      0 ENTREPRENEURS NEWCOMERS
       0.53  26292  30257   1174   3523   2979   6533    587   1762 IND.FARMERS NEWCOMER
       0.05      0      0      0      0      0      0      0      0  ART.FARMERS NEWCOMERS
       0.31   1383   2461      0      0      0      0      0      0 LABORERS NEWCOMER
     0.50 0.00 0.50 0.00  UNMODE ENTREPRENEURS
     0.55 0.30 0.15 0.00  UNMODE  INDEPENDENT FARMERS
     0.79 0.17 0.00 0.04  UNMODE  ARTISAN FARMERS
     0.85 0.07 0.03 0.05  UNMODE   LABORERS
     0.36 0.17 0.46 0.40 0.22 0.25 0.12 0.13  PRINME PRINSD
     0.33 0.11 0.38 0.39 0.33 0.25 0.04 0.09 0.17 0.00 0.17 0.06 0.17 0.11 0.04 0.09
      31   42   31   42      16.2500       0.0000 DAILY WAGE LABOR
      18   12   18   12       0.0920       0.7754  ENTERPRISE
      34   23   34   23    8420.5000    1142.0000  GOVERNMENT OR PROFESSION
     217 205 109 229    6346.2000    6929.8000  WORKING WOMEN OR CHILDREN
     0.143 0.063 0.200 0.012 0.143 0.057 0.105 0.022  PLEAVE
     0.74 0.38 0.33 0.05 0.07 0.00 0.22 0.04 0.00 0.00 0.03 0.05 0.00 0.00 PILOME
     1 1.13 1500     0 1500     0  800     0  800     0 6667     0 6667     0 SUBSISDATA
     140.6 195.5  39.3  61.7  61.71615.3 SUKGRI SUKGMZ SUKGBE SUKGMN SUKGMT SUCASH
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  421      0.80 0.75 0.39 0.39 0.39 0.39 0.39 1.00 1.00    CLPROBS (OBSERVED PROBABILITIES)
  422     ****** CLEARING PROBABILITIES USED TO FORCE A 6 YEAR FALLOW *****
  423      1.00 0.00 0.00 0.00 1.00 1.00 1.00 1.00 1.00    CLPROBS (6 YR FALLOW)
  424     ****** MORAN TYPE FREQUENCIES USED FOR MORTYP=4 RUNS *****
  425        0.00      0      0      0      0      0      0      0      0 ENTREPRENEURS ORIGINAL
  426        0.00   5265  11431    460   4210   1160   4210    285   1067  IND. FARMERS ORIGINAL
  427        0.00   1768   3186      0      0      0      0     97    456 ART. FARMERS ORIGINAL
  428        1.00   2360   6958      0      0      0      0      0      0  LABORERS ORIGINAL
  429        0.00   7849  11099      0      0      0      0      0      0 ENTREPRENEURS NEWCOMERS
  430        0.00  26292  30257   1174   3523   2979   6533    587   1762 IND.FARMERS NEWCOMER
  431        0.00      0      0      0      0      0      0      0      0  ART.FARMERS NEWCOMERS
  432        1.00   1383   2461      0      0      0      0      0      0 LABORERS NEWCOMER
END OF FILE
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