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 መረጃ ቤት ማዕከላዊ

ለ ወ ዝ

GROUNDNUT



የአርሻ ምርምር ድርጅት ።
 INSTITUTE OF AGRICULTURAL RESEARCH

፳ 2003 አዲስ አበባ ።
 ADDIS ABABA

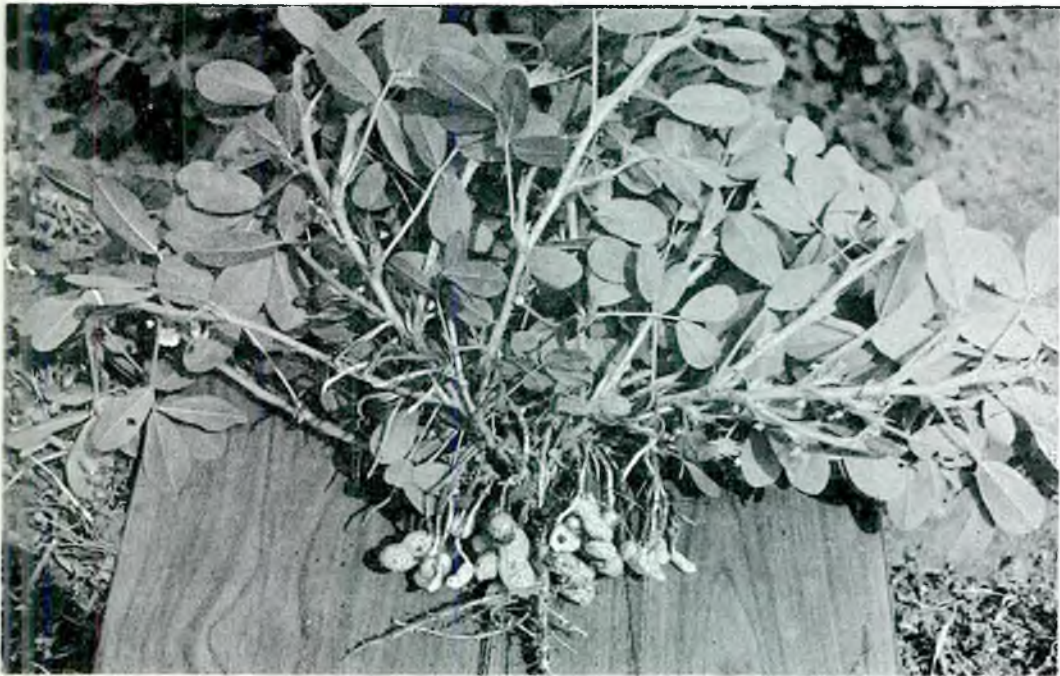
የለውዝ (አጃሎኒ) አተካከል ።

መግቢያ ፡

ለውዝ ሞቃትና ፀሐይማ አካባቢ ሊበቅል የሚችል ዓመታዊ የቅባት እህል ነው ። ውሃ የማይቋጥርና አሸዋማ መሬት ለዕድገቱ በጣም ይስማማዋል ።

የለውዝ ሴቲና ወንድ አበባ ከተገናኙ በኋላ ሐረግ መሰል ክፍሎች ከግንዱ ላይ ወደ መሬት ውስጥ ያድጋሉ ። ፍሬ የሚያፈራውም የነዚህ ሐረግ መሰል ክፍሎች ጫፍ ወደ መሬት ውስጥ ከገባ በኋላ ነው ። እነዚህ ሐረግ መሰል ክፍሎች አፈር ውስጥ መግባት ካልቻሉ ለውዝ ፍሬ ሊያፈራ አይችልም ።

ለውዝ በአገሪቱ ውስጥ የሚመረተው በእያንዳንዱ ገበሬ መጠነኛ ጥረት ነው ። ሐረርጌ ፣ ኤርትራና ሸዋ ለውዝ በብዛት የሚመረትባቸው ክፍላተ ሀገራት ሲሆኑ ሌሎችም ተመሳሳይ የአየር ጠባይ ፣ አፈርና ከባሕር በላይ ከፍታ ያላቸው ክፍላተ ሀገራት ሊያመርቱ ይችላሉ የሚል ግምት አለ ። አብዛኛው የለውዝ ዓይነት ከ120 እስከ 150 ቀናት ባለው ጊዜ ለመቆፈር ይደርሳል ።



ሥዕል 1 ከለውዝ ግንድ ላይ ሐረግ መሰል ክፍሎች ወደ መሬት ውስጥ አድገው ሲታዩ ።



ሥዕል 2 የለውዝ ተክል አበባዎችና የበቀሉ የለውዝ ፍሬዎችን እንደዚሁም ከሥር የበቀሉትን ፍሬዎች ያሳያል ።

የመሬት ዝግጅት :

መሬቱ ካሁን በፊት ለእርሻ ያልዋለና አዲስ ከሆነ በላዩ ላይ ያሉት ዛፎች፣ ቁጥቋጦዎችና ሌሎችም እወዳለሁ ተመንጥረው፣ ጉዳዎች ሁሉ ከተወገዱ በኋላ የተጠፈጠፍ ጉድጓዶች ካሉ መሞ ላትና መሬቱ መስተካከል አለበት ። ነገር ግን እርሻው የሚካሄደው በመስኖ ከሆነ አነስተኛ ቦዮች መውጣት አለባቸው ። የቦዮቹ መኖር ለውዙ በደንብ ተንሰራፍቶ እንዲያኮርትና እንዲሁም ውሃ በላዩ ላይ በቀጥታ ተኝቶበት እንዳያቀጭጫው ያደርጋል ። ለውዙ ማበብ በሚጀምርበት ጊዜ አፈር ደግሞ ማስታቀፍ ምርቱን ለማሳደግ እንደሚረዳ ተደርሶበታል ።

ከዚህ በኋላ መሬቱ ደረቅ ቢሆንም እርሻው የሚታረሰው በትራክተር ከሆነ ወዲያውኑ ሊጀመር ይቻላል ። ነገር ግን በበሬ የሚታረሰ ሲሆን መሬቱ ዝናብ ወይም የመስኖ ውሃ አግኝቶ ለመታረስ እስከሚችል ድረስ እርጥብ መሆን ይገባዋል ።

ማሳው ከዘር በፊት ጥቂት ቀደም ብሎ የተከሰከሰ እንደሆነ አስቀድሞ የበቀለ አረም ይወገዳል ። በበሬ የሚታረስን መሬት ከዘር በፊት ደጋግሞ በማረስ ማለለለ ያስፈልጋል ።

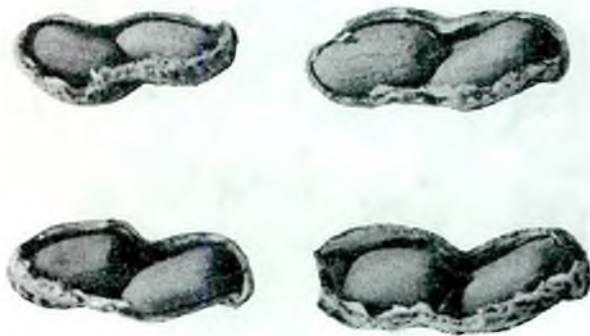
የአዘራር ዘዴ ፤

ለውዝ በመስመር ይተከላል ካልሆነም በእጅ ይዘራል ። በመስመር በሚተከልበት ጊዜ በመኪና ወይንም በእጅ መጠቀም ይቻላል ። ነገር ግን እስካሁን በጥናት እንደታየው በመስመር መዝራቱ በእጅ ከመበተኑ የተሻለ የምርት ውጤት ይሰጣል ።



ሥዕል 3 በመሥመር የተዘራ ለውዝ በደንብ በቅሎ ሲታይ ።

ዘፋ ተፈልፍሎ ወይንም እስከ ሽፋኑ ይዘራል ። ሆኖም ተፈልፍሎ የተዘራው እስከ ሽፋኑ ከተዘራው አስቀድሞ ስለሚበቅል ይመረጣል ። በሌላ በኩል ደግሞ ፈልፍሎ መዝራቱ ዘር ለመቆጣጠል ይረዳል ።



ሥዕል 4 የለውዝ ሽፋን ተገልጦ ውስጡ ያሉት ፍሬዎች ሲታዩ ።

እስከ ሽፋኑ ሲዘራ ግን አብዛኛውን ጊዜ በአንድ ሽፋን ውስጥ ከአንድ ዘር በላይ ስለሚገኝ መባከንን ያስከትላል ።



ሥዕል 5 ያልተፈለፈለ ለውዝ ።



ሥዕል 6 የተፈለፈለ ለውዝ ።

የተክል ርቀት ፣

ለአብዛኛው የለውዝ ዓይነት በፈር መካከል ያለው ርቀት 80 ሣንቲ ሜትር መሆን ሲገባው በአንድ ፈር ውስጥ የሚዘሩት ወይም የሚተክሉት ዘሮች ደግሞ 10 ሣንቲ ሜትር መራራቅ እልባቸው ። ነገር ግን ለውዙ መሬት ለመሬት ተንሰራፍቶ የሚያደግ ሳይሆን ቀጥ ብሎ የሚወጣ ዓይነት ከሆነ በፈር መካከል ያለው ርቀት 80 ሣንቲ ሜትር በመሆን ፈንታ ወደ 60 ሴንቲ ሜትር ዝቅ ሊል ይችላል ።

የዘር መጠን ፣

ከ60-80 ኪሎ በሄክታር

የዘር ጊዜ ፣

- ሀ) ከግንቦት ፳፱ እስከ ሰኔ መግቢያ ለመልካ ወረር አካባቢዎች ፤ ለጎደ ዓይነት ደግሞ ከመስከረም ፳፮-፳፰ ድረስ መዝራቱ ይመረጣል ።
- ለ) በዝናብ በሚበቅልበት አካባቢ ደግሞ 100 ሚሊ ሜትር ዝናብ ከጣለ በኋላ በአካባቢው የክረምት ወራት ሲገባ መዝራት ነው ።

ለውዝ በዝናብ በሚበቅልበት አካባቢ ተክሉ በሚያደግባቸው ወራት ቢያንስ ቢያንስ እስከ 550 ሚሊ ሜትር ዝናብ ያስፈልጋል ። በመስኖ የሚበቅል ከሆነ ደግሞ ተዘርቶ 100 ቀናት እስከሚሆነው ድረስ በየዎስትና አራት ሣምንታት ውሃ ማጠጣቱ ጥሩ ውጤት መስጠቱ በመልካ ወረር አካባቢ ተረጋግጧል ። በጎደ ዓይነት ደግሞ በየአሥር ቀናት ውሃ ማጠጣት የሚገባ መሆኑ በጥናት ደርሶበታል ።

አረም ፣

ለውዙ ከበቀለ ጊዜ አንስቶ ስድስት ሣምንታት እስኪሞላው ድረስ አረም እንዳይዘው መከላከል ያስፈልጋል ። ከዚህ በኋላ ግን ተክሉ አድጎ መሬቱን ሰለሚሸፍን አረም በቀላሉ ሊበቅልና ሊተናኮለው አይችልም ። በተለይ እንግጫ በጣም አደገኛ አረም ስለሆነ በወቅቱ እየተከታተሉ ማጥፋት ተገቢ ነው ።

ተባይና በሽታ ፣

ሀ) ተባይ ፣

- 1) ተምች መሳይ ትሎች Lesser Armyworm
- 2) አሚሪካን ቦል ወርም የተባለው ትል American Boll Worm
- 3) የተፈለፈለና ያልተፈለፈውን ፍሬ የሚበሉ ጥንዚዛዎች beetles
- 4) ክሽክሽ Groundnut Aphid

ለ) በሽታ ፣

ቅጠል ላይ ዱብ ዱብ የሚል ምልክት የሚያመጣ በሽታ Cercospora leaf spot

መከላከያ (ለተባይ)

- 1) ለተምች መሳይ ትሎች Lesser Armyworm በሂክታር 2 ሊትር ከመቶ ሃምሳ እጅ (50%) በውሃ ተበጥብጦ የሚረጭ ማላቲዬን ወይም በሂክታር 1 ሊትር ከመቶ ዘጠና ስድስት እጅ (96%) ያለውሃ የሚረጭ ማላቲዬን።ይህ ተምች መሳይ ትል የሚተናኮለው ለውዙ በቡቃያ ደረጃ በሚገኝበት ጊዜ ነው ።
- 2) ለአሜሪካን ትል American Bollworm በሂክታር 2 ሊትር ከመቶ ሰላሳ ዘጠኝ በመቶ እጅ (39%) በውሃ ተበጥብጦ የሚረጭ እንደ-ሰልፋን ወይም በሂክታር 25 ሊትር ሃያ አምስት እጅ (25%) ያለ ውሃ የሚረጭ ኢንዶሶልፋን ወይም በሂክታር 4 ሊትር ከመቶ ሃያ አምስት እጅ (25%) በውሃ ተበጥብጦ የሚረጭ ዲ. ዲ. ቲ. D.D.T. ወይም በሂክታር 2.5 ሊትር ከመቶ አርባ እጅ (40%) ያለውሃ የሚረጭ ዲ. ዲ. ቲ. ይህን ፀረ ተባይ መርጨት የሚያስፈልገው በአንድ ሚትር ካሬ ውስጥ አምስት ትሎች ወይም ከዚያ በላይ ሲታዩ ነው ።
- 3) ለክሽክሽ Aphid በሂክታር 3/4 ሊትር ከመቶ አርባ እጅ (40%) በውሃ ተበጥብጦ የሚረጭ ዳይሚቶኤት Dimethoate ወይም በሂክታር 1 ሊትር ከመቶ ሰላሳ እጅ (30%) ያለ ውሃ የሚረጭ ዳይሚቶኤት

መከላከያ (ለበሽታ)

ቅጠል ላይ ዱብ ዱብ የሚል ምልክት የሚያወጣው በሽታ ቅጠልን ብቻ ሳይሆን ግንዱንና ሌሎችንም ክፍሎች ያጠቃል ።

በሽታው እንደ ጊዜ በብዛት የተስፋፋ እንደሆነ (በወረርሽኝ መልክ ሲመጣ) የሚዘራውን የእህል ዓይነት በማለዋወጥና እንዲሁም ሰብል ከተሰበሰበ በኋላ የሚቀረውን ቃርሚያ አርቆ መሬቱ ውስጥ በመቅበር በሽታውን ለመቆጣጠር ይቻላል ።

በፀረ በሽታ መከላከያ በኩል የታየ እንደሆነ በውስጡ ድኝ ወይም የድኝና የመዳብ ድብልቅ የያዘ በብናኝ(በዱቄት) መልክ የተዘጋጀ ወይም የሚረጭ መድሐኒት መንፋት ወይም መርጨት ነው ።

መድኃኒቱ በሚነፋበት ወይም በሚረጭበት ጊዜ ከአንድ ሣምንት እስከ ሦስት ሣምንት በመቆየት እንደገና መደጋገም ይቻላል ። እስከአሁን በደንብ ታውቀው አገልግሎት ላይ የዋሉ መድኃኒቶች ቢኖሩም benomyl እና ክሎሮታሎኒል Chlorothalonil ናቸው ።

ማዳበሪያ ፤

ለውዝ ጥሩ ውጤት እንዲሰጥ የዳበረ አፈር እንደሚያስፈልገው ቢታወቅም የማዳበሪያው መጠንና አደራረግ ከቦታ ቦታ ስለሚለያይ አንድ ቋሚ መምሪያ መስጠት አይቻልም ። እስከ አሁን ድረስ እንደታየው በመልክ ወረር የእርሻ መካከ ጥናት ጣቢያ በተደረገው ሙከራ ማዳበሪያ መጨመሩ ወይም መተዉ በለውዝ ምርት ላይ ለውጥ አላሳየም ።

ጥሩ የለውዝ ዓይነት ፤

በአንዳንድ የሙከራ ጣቢያዎች (መልካ ወረር ፡ ዲዴማ ፡ ጋምቤላ ወላይታ እርሻ ልማት ድርጅት ፡ ጎዴ ፡ አርባ ምንጭ) ጥሩ ውጤት የሰጡ የለውዝ ዓይነቶች

- 1) ሹላሚዝ Shulamith ቀጥ ብሎ የሚያደግ ዓይነት
- 2) ኤጊ. ሲ. 2 N.C. 2 ብከፊል ተንሰራፍቶ
- 3) ጂ. ኤ. 219/20 GA,119-20 የሚያደግ ዓይነት
- 4) ቨርጂኒያ ቦንች Virginia Bunch

እነዚህ በዝናብ በሚበቅሉበት አካባቢ በሂክታር 20 ኩንታል ሲሰጡ በመስኖ በሚካሄድ እርሻ ደግሞ ምርቱ በሂክታር እስከ 40 ኩንታል ከፍ ይላል ። በተራ ቁጥር 1 እና 2 የተጠቀሱት የለውዝ ዓይነቶች በብዙ ቦታዎች የተሻለ ውጤት ስለሰጡ ለጊዜው ካሉት ከሌሎቹ ይመረጣሉ።

የአሰባሰብ ዘዴ ፤

ለውዝ ለመነቀል መድረሱ የሚታወቀው ቅጠሉ በጫ ሲሆን ነው ። ነገር ግን በይበልጥ ለማረጋገጥ አለፍ አለፍ ብሎ መንቀልና ፍሬዎቹን ፈልፍሎ ማየት ያስፈልጋል ።

ለውዙ ለነቀላ ከደረሰ ፍሬዎቹ ቀላ ቀላ ይላሉ ። ገና ከሆነ ግን ፍሬዎቹ ነጭ ሆነው ይታያሉ ። መድረሱ ከተረጋገጠ ነቅሎ እስኪደርቅ ሚዳው ውስጥ መተውና ከሳምንት በኋላ ዘሩን እስከሽፋኑ ሰብስቦ ማስገባት ነው ።

ለውዝ መድረሱ ከተረጋገጠ በኋላ በሰው ጉልበት ብቻ ሳይሆን ትራክተር ላይ በሚቀጠል መሣሪያም ሊነቀል ይቻላል ። ከተነቀለ በኋላ እስኪደርቅ በመስመር መተው ነው ። ከዚያም በትራክተር በሚገቡት መሣሪያ በመጠቀም ፍሬውንና ገለባውን መለየት ይቻላል ። ይህም ዓይነቱ መሣሪያ ጥሩ ውጤት የሚሰጠው በአሸዋማ አፈር አካባቢ መሆኑ ተረጋግጧል።

አሸዋማ አፈር ላይ የተዘራ ለውዝ በቀላሉ የሚነቀል ከመሆኑም በላይ ዘሩ ንጹህና ለዓይንም የሚያስደስት ሲሆን ሽክላማ አፈር ላይ የተዘራው ግን አፈሩ ለውዙ ላይ ስለሚጣበቅ ንጽሕና የጎደለው ይሆናል ።

የለውዝ ጥቅም ፤

ለውዝ ዓለም በብዛት ከሚጠቀምባቸው የቅባት እህሎች አንዱ ነው ። ፍሬው ከ45 እስከ 50 በመቶ ዘይት ሲሆን 26 በመቶ ያህል ደግሞ ፕሮቲን አለው ። የተለያዩ ቪይታሚኖች ምንጭ መሆኑም ታውቋል ።

ከነቅርፊቱ ወይም ከተፈለፈለ በኋላ ተቆልቶ ይበላል ። የለውዝ ቅቤ Peanut Butter ይሠራበታል ። የቸኮላት ፋብሪካዎች ፍሬውን በቸኮሌት በመሸፈን እንደከረሚላና ሌላም ይሠሩበታል ።

የለውዝ ጥቅም በእንስሳት በኩል ሲታይ ፣ ዘይቱ ተጨምቆ የሚቀረው ለመኖ መሥሪያ በጣም ያገለግላል ። በድርቆሽነትም መጠነኛ አገልግሎት (ጠቃሚነት) አለው ።

ለውዝ ለውጭ ገበያ ሲቀርብም ለአገሪቱ የውጭ ምንዛሪ ያስገኛል ። በአገራችን ውስጥ ያሉ የዘይት መጭመቂያ ፋብሪካዎችም ከለውዝ ፍሬ ዘይት እያወጡ ለበላተኛ ያቀርባሉ ።

GROUNDNUT

Introduction

Groundnut is an annual crop which can grow in hot and sunny areas below 1600 m with an average temperature range of 20 - 35°C. In Ethiopia this crop is produced by individual small farmers. The Administrative Regions which currently produce a large amount of groundnut are Harer, Eritrea and Shewa. There is a firm belief that other areas with similar climatic conditions, soils and altitude could produce groundnut.

Groundnut is an erect bunch or trailing herb 15 - 60 cm high with a well developed tap root. The roots have nodules which fix nitrogen; these nodules become active when the plants are about 3 weeks old. Flowers are mostly found near ground level. After fertilization the fruit develops at the end of a special stalk called the peg. This has a hard tip so that the fruit can be pushed into the soil. The peg grows downwards for 2 to 7 cm and then the tip turns into a horizontal position and the fruit develops rapidly. If the peg cannot reach the soil no fruit develops.



Fig. 1 A groundnut plant showing the white pegs which grow into the soil and the developing pods which grow in the soil.



Fig. 2 Drawing of a groundnut plant showing flowers, pegs, developing pods and the tap root covered in root nodules.

Mechanised Cultivation.

Land Preparation: if virgin land is to be prepared for groundnut growing, all trees, shrubs and other plants must be cleared away and the field leveled thoroughly.

If tractors are used for ploughing, discing and ridging can be done immediately even if the soil is dry. The best implement for ploughing is a mould-board plough of the mechanical reversible type. It is simple to use, keeps the field level and buries nearly all the trash left from previous crops and weeds.

Disc harrowing is best done after the soil has been left for a while. This allows hard and large clods to break up. The best implement for an irrigated field is a mounted two-gang offset disc harrow. This implement does not disturb the level of the field.

Ridging: Toolbar mounted ridgers on curved shanks are best for ridging. This has to be done carefully so that other field operations can be done afterwards easily. The best method so far found has been to use a four row pattern. This requires a five row ridger for the first ridging operation. It is best to start along a carefully marked centre line in the middle of the field. Ridging then follows on either

side of the first set of ridges working out to either edge of the filed. Ridges are kept parallel by keeping one ridger body in a previously drawn furrow.

Follow-up operations for re-ridging, planting, weeding, tilling, etc., should always cover the same number of rows (four) and should follow the same direction as the first ridging.

Pre-irrigation before sowing encourages weeds to germinate. They can then be killed by splitting the ridges using the toolbar ridger, this time with four bodies. This operation kills the weeds and gives an aerated but moist seedbed with good tilth. The same holds true if a re-ridging operation is carried out in rainfed areas after the first rain has germinated the weeds.

Planting: Mechanised row planting can be done with toolbar mounted unit planters with four units. If seed is buried too deeply gauge wheels can be put on the toolbar and rubber flaps on the presser wheels.

Inter-row cultivation: The best tool so far found for inter-row cultivation in irrigated fields is a lillistone rolling cultivator. Two gangs of spider wheels follow each other in a furrow. Their action hoes, slices and ridges thus producing a fine tilth, killing weeds and pushing soil up against the ridges. This leaves a clean clear furrow for irrigation.

Harvesting: No suitable tool has so far been found for mechanical groundnut harvesting in heavier soils. As most soils where groundnut could be grown on a large scale in Ethiopia are heavy, mechanised harvesting has not been done. However, machines exist for harvesting in light sandy soils in other parts of the world.

Cultivation using ox-drawn equipment.

For oxen ploughing, the soil has to be moist so that the animals can pull the implements through the soil. Although the traditional ox-plough can do most operations, including forming small ridges 45 cm apart, some work with other implements has been done. The ARDU mouldboard plough and spike tooth harrow have given good results at Melka Werer.

Satisfactory land preparation was achieved by ploughing twice and harrowing once. Ridging can be done using one ridger body mounted on a toolbar. The ridge interval can be maintained by one of the oxen walking in the furrow of the previous ridge. Row planting has to be done by hand. The seed should be sown at regular intervals in the top of the ridge. Inter-row cultivation to reduce weeds can be done with an inter-row cultivator mounted on a toolbar.

Harvesting has to be done by hand.

The time needed for these different operations on one hectare of land at Melka Werer was found to be:

first ploughing — 25 hours
second ploughing — 20 hours
spike-tooth harrowing — 6 hours
ridging — 9.5 hours
inter-row cultivation x 2 — 44 hours
hand planting — 26 man days
thinning and weeding — 182 man days
harvesting by hand — 136 man days
chopping and clearing — 36 man days
irrigation, spraying, clearing surrounding areas, etc. — 38 man days.

Promising varieties

Shulamith, N.C.2, GA 119-20 and Virginia Bunch have been found promising from trials conducted at Melka Werer, Didessa, Gambella, Wolaita, Gode and Arba Minch. The varieties have given yields upto 20 Q/ha under rainfed conditions and upto 40 Q/ha in irrigated trials. Shulamith and N.C.2 are the two favoured varieties as they have given satisfactory yields in many areas; both of these are spreading types while Virginia Bunch is a bunch type.

Moisture requirements

Groundnut needs to have a well aerated soil and should not be grown in areas or on land which gets waterlogged. Growing on ridges can keep the plants from being waterlogged, particularly on heavier soil and when the rain is heavy.

In rainfed areas at least 550 mm of rain are required during the growing period of the plants.

For irrigated areas recommendations vary and groundnut seems to tolerate quite a range of watering intervals and amounts. However, for the middle Awash the recommendation is 12.5 cm of water every 3-4 weeks until about 100 days after emergence. Irrigation can then be stopped. (Climatic parameters of Melka Werer are: mean annual rainfall 520 mm, temperatures — mean maximum 34.1 and mean minimum 22.5°C, altitude 750 m.)

In the Gode area intervals between watering should not be longer than 10 days: amounts can be 5, 10 or 15 cm at each watering. (Climatic parameters for Gode are: mean annual rainfall 320 mm, temperatures — mean maximum 36.5 and mean minimum 20.7°C, altitude 550 m.)

Fertilizers

It is a known fact that groundnuts require fertile soils for good yields. However, since the amount and type application varies from one place to another, it is difficult to set definite amounts. From observations so far at Melka Werer trials with and without fertilizers have not shown significant differences in yields.

Sowing Method

Groundnut seed is either broadcast or planted in rows. Broadcasting can give a higher plant population but weeding and harvesting are much more difficult to do effectively and efficiently.

Research has shown that higher yields can be obtained from row planting than from broadcasting. Row planting allows better weed control and harvesting is easier.



Fig. 5 Healthy groundnut plants which were planted in rows on ridges at Melka Werer Research Station.

Row planting can be done either by hand or machine (see planting). For hand sowing the seed is put into the top of the ridge. It is best to put two seeds at each place so that a good plant population can develop.

Seed: Either shelled or unshelled nuts can be used as seed. Shelled nuts are better as they germinate faster than the ones still in their shells. Soaking the seed for 24-48 hours before sowing will also give faster germination. This could be an advantage in rainfed areas where moisture can be limiting at the end of the growing season. Another advantage to using shelled nuts is that unnecessary wastage of seeds can be avoided.

However, seed for sowing is best stored in the pod until just before it is needed as it remains more viable: i.e. gives better germination.

Freshly harvested seed of some varieties cannot be used for sowing as it remains dormant for several months. Therefore it is best to use seed that is about one year old.

Spacing: Spreading varieties — 80 cm between rows and 10 cm between plants.
Upright (bunch) varieties — 60 cm between rows and 10 cm between plants.

Seeding rate: 60 — 80 kg/ha

Time of sowing: Irrigated — middle Awash, at the beginning of June,
— Gode area, October (or April),
Rainfed — beginning of the main rains (krempt.)

Weeding

Groundnuts cannot compete with weeds until their growth has covered the ground.

Handweeding has to be done at least three times, which is expensive for large scale production. The first weeding must be done before the crop is 30 days old, the second between 40 and 50 days and the third between 60 and 80 days after emergence.

For row planted crops most weeds can be controlled by inter-row cultivation with some additional hand weeding in the rows if the weed density is very high. Timing for inter-row cultivation is similar to that for handweeding. However, the last cultivation should be made at 50% flowering and not later: if it is done later the developing pods will be damaged.

Some herbicides have given good control at Melka Werer and most of these have been found cheaper to use than handweeding alone. Terbutryne at a rate of 2.0-3.0 kg/ha active ingredient has given good weed control for 5 to 6 weeks. It is applied one day after planting. A late weeding, between 60 and 80 days after emergence, is still needed. However, this late weeding has the advantage of loosening the soil around the plants and enabling ridging-up to take place which makes it easier for the pegs to penetrate the soil.

Nutgrass (ingicha*), *Cyperus* spp. is a dangerous weed that needs to be eliminated before a large population gets established. Unless controlled this weed can take over large areas in fields. It can be controlled out of the growing season by ploughing and leaving rough clods of soil on the surface to dry out. This will kill the underground parts of this weed.

No herbicide has been found which will kill nutgrass without also killing the crop. However, vernolate at a rate of about 4 kg/ha active ingredient has given some control. It is applied between 1 and 2 weeks before sowing by spraying on the soil surface and then lightly mixing it into the soil.

Harvesting

Groundnut is ready for harvest when the leaves turn yellow. However, it is best to check if the seeds are ready by pulling up a few pods and opening them. Ripe seeds are red while unripe ones are white.



Fig. 4 Groundnut pods opened to show ripe nuts.

In light soils plants can be pulled up by hand and left on the surface to dry. In heavier soils a fork is used to lift the plants. The soil is then shaken off and the plants left to dry for one week in the field. They can either be left on the soil surface or put onto wooden racks. Racks are useful if the soil is still moist. When dry, the pods are pulled off the plants.

Machine harvesting can be done in light sandy soils. But most soils in Ethiopia are too heavy for machine harvesting and lifting the plants by hand is best.

Pods from sandy soils are clean and easy to handle; those from clay soils appear dirty because of the mud sticking to them.

Storage

Material needed as seed for the coming year is best stored in the pod as this gives better viability. Hand shelling is best for seed as the nuts do not get so

* Amharic name.

easily damaged. For the rest of the harvest, there are several hand operated machines available for shelling groundnuts. EPID has some of these.



Fig. 5 A handful of ripe groundnut pods.



Fig. 6 A handful of ripe shelled groundnuts.

Pests

Name	Control
1. Lesser Armyworm (on seedlings only)	1 litre/ha of 96% malathion ULV or 2 litre/ha of 50% malathion EC
2. American Bollworm (leaf eater) when 5 or more worms are found in a square metre of the field	2 litre/ha of 39% endosulphan EC or 2.5 litre/ha of 25% endosulphan ULV 4 litre/ha of 25% DDT EC, or 2.5 litre/ha of 40% DDT ULV.
3. Groundnut Aphid	0.75 litre/ha of 40% dimethoate EC or 1 litre/ha of 30% dimethoate ULV.

Diseases

Cercospora leaf spot is the major leaf disease of great economic importance. Dusting or spraying at 1 to 3 week intervals with chemicals containing sulphur or sulphur and copper mixtures has proved successful in combating this disease. So far benomyl and chlorothalonil are known for their effectiveness.

If the disease reaches epidemic proportions it can only be controlled in that area by proper crop rotation and burying or burning all the diseased plants. The best way to stop this disease getting to new areas is to use seed which is known to be free of the disease, i.e. clean seed.

Stored seed can be attacked by an *Aspergillus*, this fungus grows best in humid conditions. This fungus produces the poison, aflatoxin. Seed should be kept as dry as possible. If there is any possibility that *Aspergillus* has attacked the seed, a sample can be sent to the Ethiopian Grain Agency for testing. This seed should NOT be eaten or given to other animals such as poultry until it is known to be free of aflatoxin.

Uses

Groundnut is grown on a large scale throughout the warmer parts of the world as an oil crop. The oil content can range between 38 and 50% and the protein content is also high reaching 30% in some varieties. The nut is also a source of vitamins and other nutrients.

Nuts are eaten either fresh or roasted. In many countries, including Ethiopia, this crop is an important source of oil. The oil is a semi-drying type which can be used for cooking as well as for making soap. High quality peanut oil is used in the pharmaceutical industry. Chocolate factories also use large quantities of peanut oil. Peanut butter is produced in large quantities in some countries.

After oil extraction, the remaining cake makes a very nutritious animal feed and is used to feed people in some places. The dried plant (halm) is also a valuable food for animals.

Export of groundnut could earn foreign currency for Ethiopia. More important, many oil factories in this country do not have enough material for full time production and several actually depend on a groundnut supply. It is hoped that this bulletin will therefore encourage more and better groundnut production. As a legume, groundnut could be a useful crop to rotate with cotton on some of the larger State Farms.

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