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1ST MONTHLY PROGRESS REPORT

Bogotá, Colombia

"Development of Weed Control in Less Developed Countries"

USAID/Oregon State University

Regional Contract No. AID/csd-1442

Submitted Aug. 1, 1967

by

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1ST MONTHLY PROGRESS REPORT

Bogotá, Colombia

This first report is largely a resumé of field trips which were taken to become familiar with the Experiment Station complex in Colombia. On the way to Colombia a stop was made in Chapingo, Mexico to visit with Dr. Nieto. He is doing some excellent work on determining the extent of weed damage in specific crops. The work will be published in the near future.

Upon arrival in Colombia (July 1) I was greeted at the airport by Dr. Colwell and Dr. Jeffery of the U. of Nebraska mission. Both gentlemen were a great help in assisting with my needs and introducing me to several people. Dr. Colwell is head of the Nebraska-AID mission and Dr. Jeffery is in charge of weed control for the mission. The first week consisted of visits to several people associated with agriculture in the Bogotá area. A great deal of time was spent with Dr. Jeffery and Dr. Revelo (Head of Entomology and Weed Research at Tibaitata) discussing their research results. Dr. Jeffery has initiated preliminary research involving competition studies in potatoes, beans and rice. Also, there are a number of herbicide trials with a majority being in Tibaitata. Several of the trials are associated with student theses. Lack of transportation plus the difficulty of travel make it hard for the local personnel to get around to other experiment stations. At Tibaitata, Dr. Jeffery has an experiment in progress with kikuyo grass and Daxtron at 1-2 kg/ha is the best treatment. Dalapon, amitrol and bromacil at 10 kg/ha are of questionable value. The average cost to control kikuyo grass in infested potato fields is 400-600 pesos/ha and it can run as high as 2000 pesos/ha ($24-$36 US cy to $120 US cy). The soils in Tibaitata have an exchange capacity of 11-55 meq. and the organic matter is 5-18%.

An interesting visit with Luis Balbuena, Head of barley breeding, revealed the following facts: Two crops of barley are grown per year in the Botota area, 1st crop - Feb. to July, with a total of 45,000 hectares (ha) and 2nd crop - Aug. to Jan. with a total acreage of 30,000 ha.

On July 8 a meeting was attended at which it was learned that the Ministry of Agriculture has created a committee to assess pesticide use in Colombia. This committee will make recommendations to the ministry as to the compounds which are to be formulated in Colombia. The committee is composed of the following members:

1. The head of the division of crops in the ministry (or his representative).
2. The head of ICA's Entomology Dept. (either Dr. Revelo or Dr. Posada).
3. A representative from the institute of technological research.
4. A representative from IFA (Cotton Inssitute).
5. An industry representative chosen by the ministry from a list submitted by ANAPALES (Natl. Assoc. of Pesticide Producers).
6. A representative from the Federation of Farmers.

A conference was held with Dr. Revelo on July 10 at which he mentioned that a pesticide law was passed recently. Upon receipt of this law I will translate a brief resumé of the pertinent points and circulate copies to interested parties. The following is an example of a short excerpt:

Question: On registration, when two companies produce the same chemical, such as Stam (Rohm & Haas) and Rogue (Monsanto) or Lorox (du Pont) and Afalon (Hoechst), what are the registration procedures?

Answer: Due to the big difference in activity, probably due to formulation between Lorox and Afalon, a certain amount of testing will be needed but not as much as the originally registered compound.

Dr. Revelo introduced me to the following staff list of ICA:

Chief - Dr. Miguel Revelo

Weed Control	Entomology
Larry Jeffery	Alfredo Saldarniga
Carlos Romero	Carlos Carmona
Hernando Franco	Alvarez
Cruz Molina (Nataima)	Inge. Zenner
Ramiro de la Cruz (Palmira)	Urueta
Edilberto Lagos	Emiro Rojas
Octavio Franco	
Victor Calderon (½ W.C. & ½ Ent.)	
Antonio Beltran (attaché from Rice Federation)	
Cesar Cardona (Palmira, Horticulture)	

The main crops which will receive weed control attention via ICA are rice, cotton, small grains, potatoes, beans, sugar cane, corn, sorghum and vegetable crops. Ditch banks, irrigation canals, orchards and pastures also will be considered. The "Growers Federation" will handle coffee, tobacco and bananas. At present, Dr. Revelo holds one annual meeting to discuss research results but with the program expansion we will try to have several per year. Also, it has been established that a person with a B.S. degree will have to work for two years before pursuing M.S. degree studies in the United States. At present only two experiment stations are doing weed control research but this will be expanded in the near future.

A visit was made to the Aeroclub which sells spraying airplanes. The most common airplane in use in Colombia is the Piper 235 with a capacity of 140 gal. Insecticides are sprayed at 7-10 gal./ha at a cost of 25-30 pesos ($1.50-$1.90 US cy). An herbicide (Stam) is sprayed at 20 gal/ha of spray mix at a cost of 50 pesos ($3.00 US cy). Urea fertilizer is applied at a cost of 28 pesos/ha. The minimum order for spraying is 5 ha and the minimum charge is for 10 ha. A beginner pilot makes about 4 to 5 pesos/ha (24-30¢ US cy) and an experienced pilot 8 pesos/ha (48¢ US cy). An insecticide and herbicide swath will cover approximately 13 meters. They take good care of the pilots with periodic checkups, however many deaths occur among flagmen and people involved in handling the concentrated insecticides. Laborers refuse to wear masks, rubber gloves and protective clothing because it is too hot in the areas.

The remainder of the report will discuss observations made on field trips to the various experiment stations.

Nataima Experiment Station

Nataima is located in the Depto. of Tolima near the town of Espinal (96 miles southeast of Bogotá). The station has an elevation of 400 meters and a temperature range of 25-40° C. Mr. Fabio Zapata (OSU 1967 graduate) is director of the Nataima Station and he is assisted by Emiro Rojas and Cruz Molina who are responsible for research in the area of weed control and entomology. The following

observations were made on July 6 on a crop basis:

Rice: Ninety percent of the rice is direct seeded, flooded until germination, water withdrawn until tillering, then the fields are reflooded and kept under 2 inches of water until near harvest. One of the primary pests of rice is an insect called "sogata" which transmits a virus disease called "hoja blanca." A number of phosphate insecticides including Parathion are being sprayed. Very limited 2,4-D is sprayed due to cotton growing nearby. 2,4-D spraying is allowed but it requires special permission from the government and needs to be approved by an agronomist. The main weeds in rice are:

1. Desmodium spp. (Beggarweed)
2. Cyperus spp.
3. Ipomoea spp.
4. Amaranthus spp.
5. Digitaria sanguinalis
6. Echinochloa crusgalli
7. Jussiaea spp.

Of the above 2, 3, 5 and 6 are noxious problems. Soils on the experiment station are quite sandy and underlying these soils is a clay pan. Fertilization of rice consists primarily of applying 100 kg/ha of nitrogen prefillering and again after tillering. South of Melgar we inspected a dry-land rice field ready for harvest. It was heavily infested with Echinochloa crusgalli, crabgrass and some Jussiaea spp. which will undoubtedly interfere with harvest.

Wheat: ICA has developed two wheat varieties adapted to the hot area, but the crops have not been successfully established because of weed problems.

Cotton: Only 1 crop per year is grown because of insect damage, but two crops could be grown. Cotton is planted in Feb. and March and harvested in July. The government will not allow a second crop because of insect damage. Crabgrass appears to be the major problem, followed by morning glories. The crop is harvested by hand and the bolls (motas) are carried to the truck in sacks for transport to the cotton gin (desmotadora).

Corn and Sorghum: Two crops are grown per year in the months of March to July and September to January. Main weed problems are crabgrass, Desmodium spp. and wild cucumber. Morning glory is also an occasional problem. The effect of weeds on sorghum growth is noteworthy. It was interesting to note that Ramrod and CP 50144 at 3 kg/ha did not control crabgrass but at 5 kg/ha fair control was obtained. Apparently these compounds gave good control initially but they were short-lived. Diuron in both corn and sorghum gave excellent control.

Irish Potatoes: Afalon (linuron) from Hoechst did not injure potatoes but Lorax (linuron) from du Pont killed potatoes.

Sesame: This crop is being introduced to replace the 2nd crop of cotton. Prefor was the only herbicide which gave good weed control with no crop phytotoxicity to sesame.

A second visit was made to the station on July 26 to 28 to view experiments in corn, sorghum, cotton and rice; to visit farmers in the area as well as the Cotton Federation and Cotton Institute research personnel.

Corn and Sorghum Experiments: The main weed problems in corn and sorghum are Digitaria sanguinalis and Desmodium spp. There is some Amaranthus hybridus and Ipomoea spp. Gesaprim (atrazine) 2 kg/ha is used commercially with excellent results, but its use in the corn-cotton-rice rotation is of concern. Information should be obtained on the atrazine residual and its influence on cotton and rice.

Rice Experiments: In rice, the seed is hand-sown in rows and covered (drilled rice) with subsequent flooding with about 2 inches of water until germination. Water is then withdrawn until tillering. Stam (propanil) is applied at about tillering or between 15 to 20 days after germination at which time the fields are flooded for short periods. After tillering the field is flooded again till harvest. There are at least three flushes of weed populations: first, nutsedge and Echinochloa spp. predominate during the initial flooding; secondly, when the water is withdrawn after germination Digitaria and Ipomoea take over; and the final flush of weeds with reflooding are nutsedge, Echinochloa and Jussiaea spp. Afalon (linuron) applied pre-emergence with a delay in flooding, 1 week, is non-toxic; however, if flooded immediately after application, rice toxcity is obtained. Lorox (linuron) is toxic to rice. More research work should be conducted with the possible use of Afalon in rice. At present the weed populations are so high in rice fields that approximately 50% of the rice stand is thinned with the hand removal of weeds. C-6989 gave good weed control at 4 kg/ha post-emergence (including nutsedge) but poor weed control was noted when used pre-emergence. This compound should be investigated with upland rice.

Plans for the next semester research were discussed while at Nataima and a second planning meeting for all Weed Control and Entomology personnel was set for August 19 or 21.

The visits to farms in the region were not made because no vehicle was available.

The third objective, visits to the cotton research facilities, was a total success. Three organizations, ICA,Cotton Federation and Cotton Institute, have been doing independent research for a period of years. After visiting representatives of the cotton organizations, it was suggested that the weed control efforts be coordinated to a greater extent. A meeting was set up with the Ministry of Agriculture and a working relationship between all organization was established. Cotton acreages for the area are:

Cauca Valley	1966	7,700 ha	(average yield of 2400 kg/ha)
Tolima Norte	1966	12,000 ha	(" " " 1810 ")
Tolima Sur	1967	25,000 ha	(" " " 1800 ")
Coast area	1966	130,000 ha	(" " " 1060 ")

The low yield per hectare in the coast area is attributed to poor management, mainly lack of insect control. The Cotton Federation published herbicide recommendations for use only in the Tolima Sur area. Plans are being made to do weed research in the other areas listed above. Treflan, Karmex, Cotoran and Herban are the recommended cotton herbicides. Nutsedge is a serious problem in the coast area and morning glory in the interior. The following is a list of cotton weeds:

Scientific Name	Common Name
Amaranthus hybridus	bledo blanco
Boerhaavia erecta	cadillo lagaña
Borreria densiflora	yerba de tortero
Cassia fora (Emelista fora)	chilinchil
Cenchrus brownii	cadillo carreton blanco
Corchorus orinocensis	espadilla
Croton glandulosus	mostrantillo
Cyperus sp.	cortadera; coquita, paja de Pisco
Desmodium tortuosum	amor seco, pega pega, cadillo Juancho
Digitaria sanguinalis	guarda rocio
Echinochloa colonum	liendre de puerco
_____ crusgalli	arrocillo
Eleusine indica	grama de horqueta
Euphorbia hirta	yerba de pollo
_____ hypericifolia	canchalagua
Heliotropium purdici	estrellita
Ipomoea sp.	batalilla
Kallstroemia maxima	atarraya
Leptochloa filiformis	paja colorada
Mollugo verticillata	tomillo
Phyllanthus diffusus	balsilla
Physalis sp.	verigon
Portulaca oleracea	verdolaga
Sida rhombifolia	escoba negra

Turipana Experiment Station

Turipana Experiment Station is located five minutes from the city of lonteria. The city is located in the Depto. of Córdoba on the northern coast of olombia. The region is low in elevation and quite hot. Cotton is the primary rop grown along with some corn and soybeans. Three crops per year would be ossible if there were a way of enhancing the harvesting and drying of the corn. r. Carson from Rockefeller is researching with paraquat as a corn dessicant.

The region is also an important cattle area. Along the coast cotton is lanted only in the second semester (August) as compared to the interior where otton is grown in the first semester (planted in March). Approximately 70,000 ectares are being brought under irrigation, hence the cotton and corn acreage ay increase and possibly soybeans.

Hector Diaz is the Director of the station assisted by Fernando Arboleda chief corn breeder) and Guillermo Medina (also a corn breeder). There is no weed pecialist at Turipana but plans are under way to establish a position. At present o cotton research is being conducted on the station, but work will be initiated in ugust in cooperation with IFAC (Instituto del Formento Algodonero) and the otton Federation.

The only weed control completed in the Monteria region to date was that by r. Carson (Rockefeller) and this was limited to atrazine (Gesaprim) in corn. he results with 2 kg/ha are outstanding. The weed problems in the area consist f nutsedge (severe problem) and a mixture of the following weeds:

Cassia fora (Emilista fora)
Amaranthus hybridus
Portulaca oleracea
Echinochloa spp.
Digitaria spp.
Cyperus spp.
Ipomoea spp.
Eleucine indica

In fields where Cyperus is the only weed, corn has to be replanted two or three times before a satisfactory stand can be obtained. Plans for research in corn during the coming semester include:

1) Herbicide screening trials which will include chemicals which have been tested in Colombia and recommendations from chemical companies to satisfy their research contract with ICA.
2) Chemical control of nutsedge in corn.
3) Competition study - Cyperus in corn.
4) Atrazine residue on cotton following corn.

The above will be conducted at Turipana in cooperation with the previously mentioned corn breeders. Plans for cotton research will be discussed later in this report.

Medellín Experiment Stations

Medellín is an industrial city which is in the Depto. of Antioquia. There are three stations in the region: Tulio Ospina Experiment Station (Ernesto Arango - Director), La Selva Experiment Station (Alberto Mesa - Director), and El Nus Experiment Station.

Ing. Carlos Carmona is in charge of weed and entomological research for all three stations. At Tulio Ospina herbicide trials have been conducted with bean and corn screening. The major weed was Cynodon dactylon; therefore many of the present-day herbicides were ineffective. The main weeds in the region of Tulio Ospina are:

Amaranthus hybridus	bledo
Brachiara mutica	pasto Pará
Cassia fora (Emilista fora)	
Crotolaria spp.	crotolaria, cascabel
Cynodon dactylon	pasto argentina
Cyperus spp.	coquito, cortadera
Digitaria sanguinalis	guardarocio
Eleusine indica	pata de gallina
Emilia sonchifolia	
Galinsoga parviflora	galinsoga
Xanthium occidentalis	falso cadillo

At La Selva the main crops are corn and potatoes and the important weeds: D. sanguinalis, G. parviflora, B. mutica and Polygonum segetum. The soil at La Selva is black, pH 5 to 5.5 and organic matter 26 to 28%. Commercially in this region farmers are using DNBP, amine at 6 kg/ha with good results. They need 30-40 ton lime per hectare to raise the pH in top soil which is only 10 cm (4 inches) in depth. The usual application is 3000 to 5000 kg/ha for 3 to 4

years and potatoes are fertilized with a ton of 10-30-10. Cost of potato seed pieces is $12 US/ha and fertilizer $9 US/ha. Cost of commercial formulations of herbicides in region are Karmex and Atrazine - 80 pesos (4.80 US cy)/kg; Gramaxone (paraquat) - 360 pesos ($21.00 US cy)/gallon; dalapon - 12 pesos ($.80 US cy)/kg and TCA 15 pesos ($.95 US cy)/kg.

Two pasture weed species in the Medellín area are guava and bracken fern. Many farms are small in this area (less than 20 ha/farm) hence weed research trials should include granular formulations. Mechanical control methods should also be researched with because most herbicides are short-lived under the conditions which prevail in this area.

Plato Region (no Experiment Station)

Plato is an outpost on the Magdalena river in the Depto. of Magdalena. This is a potentially important area for agriculture. The region could be made productive by flood control and irrigation systems. As it is now, cattle are foraging on pastures which are heavily infested with brushy weeds. Nearly 1,000,000 hectares are in brushy type pastures which have a low carrying capacity. Aerial application should be considered in establishing experimental plots since the ground cover is too dense. Dr. Larry Jeffery has obtained good brush control with many formulations of Tordon. Some of the lightly infected lands can be cleared by bulldozers at a cost of 100 pesos ($6 US cy). Research in this area will be considered in the future but at present transportation to the area is difficult. Plans are underway to do some cotton herbicide research work north of Plato near the coast.

Palmira Experiment Station

The Palmira Experiment Station is an excellent facility because of its staff and the agricultural importance to Colombia of the surrounding region. The staff includes Ing. Alfredo Saldarriaga (Leader of Entomology), Ing. Ramiro de la Cruz (on leave to Iowa State for MS degree under Stanforth) and Ing. Edilberto Lagos (successor to de la Cruz). Ing. Manuel Rosero is the ICA Director of the rice program at Palmira. Ing. Alberto Sanchez Potes researches in the Buga-Valle region for IFA (Cotton Institute) and wants to cooperate with us (ICA) on weed control research in soybeans, cotton and African oil palm. Ing. Victor Calderón (ICA sugar cane researcher) wants to cooperate with us on sugar cane weed control. The following are results from a nutsedge experiment underway at Palmira:

1. Daxtron 2 kg/ha - excellent initial burn but no residual control.
2. 2,4-D amine 2 kg/ha plus surfactant - excellent suppression of nutsedge but no complete kill. Apparently nutsedge is quite sensitive to 2,4-D at certain stages of growth. An experiment will be done to determine the most susceptible stage of nutsedge to 2,4-D.
3. Vernam 4 kg/ha gave excellent weed control in beans with no phytotoxicity.
4. Eptam 4 kg/ha gave good weed control in beans and corn with slight injury to corn.
5. DSMA 5 kg/ha gave good initial burn but nutsedge came back. Repeated applications are needed.
6. 2,4-D amine at 1/2 kg/ha controlled Ipomoea in corn.
7. Herban 2.5 kg/ha does not control Ipomoea.

Atrazine is not recommended for corn if cotton is to follow. At Palmira they have a solid infestation of nutsedge on much of the station and about eight different species of Ipomoea and Cenchrus brownii. Many herbicides are giving excellent weed control but the residual effect is only about two months. Either layby treatments or cultivation will be needed to extend the necessary residual weed control requirements of many crops.

The synergistic phytotoxic action of Afalon + 2,4-D observed at Nataima on rice was also noted at Palmira on sorghum. CP 50144 was slightly toxic to sorghum at 3 kg/ha but it did give good weed control. Excellent weed control was obtained in corn with Afalon plus Atrazine (.8 + .8 kg/ha). DNBP, amine 8 kg/ha, Treflan + Lorax (.75 + .75 kg/ha), and Treflan 1.5 kg/ha all gave good weed control in soybeans; however, the DNBP,amine was short-lived. Recommendations of herbicide application by stage of weed development is impractical since weeds are continuously germinating.

In onions Afalon at 1.5 kg/ha and C 6989 at 5 kg/ha gave excellent weed control with no phytotoxicity. Cotoran, Karmex and Atrazine were toxic to onions. Good weed control was obtained in rice with Glenbar 4.5 kg/ha, C 6989 4 kg/ha (postemergence), Afalon 1 kg/ha and R-4574 3 kg/ha. Stauffer will market R-4574 in Colombia instead of Ordram.

Colombia has 450,000 hectares of sugar cane with 110,000 ha in Cauca Valley. Average yield of cane in Valle is 90 tons/ha with the first crop cut at 18 months and the ratoon crop at 14 months. Sugar cane is grown under a 6 year ratoon program but some fields have been in production for 20 years. The critical period for weed control is during the first four months. Standard weed control treatment is TCA + 2,4-D at 10 kg plus 1.5 kg/ha. Herbicides that have given good results in sugar cane are: Ametryne 3.5 kg/ha, Ametryne plus Atrazine 2.5 plus 2.5 kg/ha, Herban plus 2,4-D at 2.5 plus 1.5 kg/ha. Ditchbank treatments are diuron 15 kg/ha, TCA plus 2,4-D 30 kg plus 3.3 kg/ha or Afalon at 6 kg/ha to control Bermuda grass. Cost of herbicides for cane are as follows:

Karmex	$160-200/plaza	$20 to $26 US cy/ha
TCA	4 pesos/kg (10-15 kg/ha)	$2.40 to $3.60 US cy/ha
Afalon + 2,4-D	4 kg plus 1 kg/plaza	$25 to $27 US cy/ha
Karmex + 2,4-D	4 kg plus 1 kg/plaza	$ 27 US cy/ha
TCA + 2,4-D	15 lb plus 3.3 lb/plaza	$ 12 US cy/ha

Sugar cane is treated with 54 gal water/plaza (90 gal/ha or 37 gal/acre). The cost of Herban is 40 pesos ($2.40 US cy) per pound and DSMA 8.50 pesos ($.50 US cy) per pound.

It was noted that an insect called "cochon" feeds on Portulaca oleracea.

Obonuco Experiment Station

Obonuco is situated in the Pasto region in the Depto. of Naimo which is located near Ecuador. This region is very mountainous with an elevation of 8700 to 9000 feet. The main crops are wheat, barley and potatoes, and the weed problems are principally broadleaf weeds. About 6 species of Chenopodium are located on the station

Ing. Alonso Alvarez is in charge of both entomology and weed control research. He stated that the farms are relatively small (20 hectares or less) and all possible

slopes are cultivated. More wheat is grown in this region than in any other part of Colombia.

In potatoes the treatments were Sinbar at .8 kg/ha and Caldon (Hoescht DNBP) at 8 liters /ha. Afalon is sold in Colombia in many sized packages including 20 gm sacks for 100 sq. meters at a cost of $.17 US cy per sack. Weeds noted in Pasto were primarily as follows:

Chenopodium spp. (at least six different species)
Polygonum segetum
Rumex spp
Senecio vulgaris
Capsella bursa - pastoris
Brassica campestris
Brassica arvense
Raphanus raphanistrum
Avena fatua
Erigeron canadensis
Poa annua
Solanum nigrum
Lolium temulentum

No research plots will be established in this region in the near future since the results from the Bogotá station will apply to this area.

I met Ing. Diego Robledo, Director of regional testing for Caja Agrana (credit organization of the government) and he offered his cooperation, particularly for weed control trials on hotland wheat. Ing. Robledo mentioned that Colombia needs 360,000 tons of wheat per year and at present 140,000 tons are imported each year. He is of the opinion that there is no technical reason why Colombia should not be self-sufficient in wheat and barley.

Although I toured all but one of the experiment stations in Colombia, it was just at harvest or between crops at each station. A more exact report of the weed problems will be presented in the future. The following figures are presented for the 1966 production of pesticides in Colombia:

Insecticides	4300	metric tons
Fungicides	1500	" "
Herbicides	1250	" "
Others	2	" "

It is estimated that the industrial plants are working at only 50% capacity. Actual consumption of the above are estimated at 20% more than the above figures due to the importation of formulated products. The following are prices of commonly used herbicides in Colombia:

	Pesos	$ US
Kilex 1 (2,4-D amine 4 lb/gal)	59.50 gal	3.60
Kilex 2 (2,4-D ester 3.34 lb/gal)	59.50 gal	3.60
Kilex 2-3 (2,4-D ester 2 lb plus 2,4,5-T ester 2 lb/gal)	100.00 gal	6.00
Kilex 3 (2,4,5-T ester 3.34 lb/gal)	119.50 gal	7.10
Karmex 80% W.P	39.00 lb	2.40

Surfactant (liquid)	100.00 gal	$ 6.00
Treflan	125.00 liter	8.00
Herban	55.00 lb.	3.30

Several weed lists have been forwarded to Oregon State University for filing. A revision of OSU/AID Mimeo 67-2 will be made at a future date. A copy of Public Law 799, "Control de Plaguicidas Defoliants y Reguladores de las Plantas" was also forwarded to OSU.

Research weed trials will be installed shortly in Nataima, Palmira, Bogotá, Monteria and possibly Llanos.

WEEDS IN SMALL GRAINS IN THE DEPTO. OF CUNDINAMARCA AND BOYACA

Scientific Name	Common Name
Avena fatua	avena silvestre, avena negra
Brassica campestris	nabo
Bromus unioloides	triguillo
Capsella bursa-pastoris	calzoncitos
Chenopodium paniculatum	cenizo
Euphorbia orbiculata	leche eterna
Galinsoga parviflora	guasca
Graphalium spicatum	vira-vira
Lactuca inthybacea	cerraja
Lolium temulentum	vallico
Malva silvestris	malva morada
Malvastrum peruviana	-
Medicago hispida	carretón cadillo
Pennisetum clandestinum	kikuyo
Phalaris minor	alpiste
Polygonum hydropiperoides	yerba de sapo
_____ nopalense	barbasco
_____ segetum	qualola
Raphanus raphanistrum	rábano
_____ sativas	rabano morado
Rumex acetosella	ramacilla, envidia, sangre toro, acedera
_____ crispus	lengua de vaca, tomaza
Salvia palaefolia	botón morado, mastranto
Silene gallica	chorotico
Sonchus oleraceus	cerraja
Spergula arvensis	abrojito
Taraxacum officinale	achicoria
Trifolium dubium	trébol dorado
_____ procumbens	carretón amarillo
Veronica persica	veronica, golondrina

WEEDS IN POTATOES IN THE DEPTO. OF CUNDINAMARCA AND BOYACA

Main Weeds

Amaranthus hybridus	bledo
Brassica campestris	nabo
Chenopodium paniculatum	cenizo
Galinsoga parviflora	guasca
Lepidium bipinnatifidum	mastuerzo
Malva silvestris	malva blanca
Pennisetum clandestinum	kikuyo
Polygonum segetum	qualola
Rumex crispus	lengua de vaca

Secondary Weeds

Capsella bursa-pastoris	bolsa de pastor
Lactuca inthybea	cerraja
Spergula arvensis	miona
Trifolium sp.	trébol
Veronica persica	violetilla