



syngenta

Reg. No. L5749 Act No. 36 of 1947 N-AR 0716 (Namibia) W130331 (Botswana)

An emulsifiable concentrate herbicide for pre-emergence control of annual grasses and under certain conditions also yellow nutsedge in various crops under different climatological conditions in combination with different broadleaf herbicides.



Hazard statements:

Very toxic to aquatic life with long-lasting effects. May cause an allergic skin reaction.

Precautionary statements: Keep out of reach of children.

Prevention: Avoid breathing dust/fumes/gas/mist/vapours/spray. Wear protective gloves. **Response:** If skin irritation or rash occurs, get medical advice/attention. Take off contaminated clothing and wash it before re-use. Collect spillage. **Storage:** Store locked-up. **Disposal:** Dispose of contents/container to an approved waste disposal plant.

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GROUP 15 HERBICIDE

Active Ingredient:
s-metolachlor (α-chloroacetamide)... 915 g/l



WARNING

Product names marked ® or ™, the ALLIANCE FRAME, the SYNGENTA Logo and the PURPOSE ICON are Trademarks of a Syngenta Group Company

1. WARNINGS:

Hazard statements: Very toxic to aquatic life with long-lasting effects. May cause an allergic skin reaction.

- Handle with care.
- Harmful if swallowed.
- May cause sensitisation by skin contact.
- Toxic to fish.
- Store in a cool place.
- Store away from food and feed.
- Keep out of reach of children, uninformed persons and animals.
- **In case of poisoning:** Contact a doctor and present this label.
- **Re-entry:** Do not enter treated area within one (1) day after application unless wearing protective clothing.
- **Aerial application:** Notify all inhabitants in the immediate vicinity of the area to be sprayed and issue the necessary warnings. Do not spray over or allow the drift to contaminate water or adjacent areas.

Although this remedy has been extensively tested under a large variety of conditions, the registration holder does not warrant that it will be efficacious under all conditions because the action and effect thereof may be affected by factors such as abnormal soil, climatic and storage conditions, quality of dilution water, compatibility with other substances not indicated on the label and the occurrence of resistance of the weed against the remedy concerned, as well as by the method, time and accuracy of application. The registration holder furthermore does not accept responsibility for damage to crops, vegetation and the environment, or harm to people or animals or for lack of performance of the remedy concerned due to failure of the user to follow the label instructions or to the occurrence of conditions, that could not have been foreseen in terms of the registration. Consult the supplier in the event of any uncertainty.

2. PRECAUTIONS:

Precautionary statements: Keep out of reach of children. **Prevention:** Avoid breathing dust/fumes/gas/mist/vapours/spray. Wear protective gloves. **Response:** If

PRECAUTIONS cont.

skin irritation or rash occurs, get medical advice/attention. Take off contaminated clothing and wash it before re-use. Collect spillage. **Storage:** Store locked-up. **Disposal:** Dispose of contents/container to an approved waste disposal plant.

- Do not inhale the spray mist.
- Avoid skin contact.
- Wash with soap and water after use.
- Wash contaminated clothing after use.
- Do not eat, drink, or smoke while mixing or applying the product or before washing hands and face.
- Avoid drift of spray onto other crops, grazing, rivers, dams, boreholes and areas not under treatment.
- Clean applicator after use. Dispose of rinsate where it will not contaminate crops, grazing, rivers, dams and boreholes.
- Prevent contamination of food, feed, drinking water and eating utensils.
- Rinse the empty container three (3) times with a volume of clean water equal to a minimum of 10% of that of the container. Add the rinsate to the contents of the spray tank before destroying the container in the prescribed manner.
- Do not use the empty container for any other purpose.

Symptoms of human poisoning: Sedation (calming), dyspnoea (difficulty breathing) and exophthalmia (protrusion of the eyeball).

First Aid and Medical Treatment:

If poisoning is suspected immediately call a doctor. Remove patient from further contact with pesticide and place patient in a well-ventilated area. In case of eye contact hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. In case of skin contact, wash with plenty of soap and water. Consult a doctor if irritation persists. If the substance has been swallowed promptly administer a large quantity of milk, egg whites, gelatin solution or, if these are not available large quantities of water. Do not induce vomiting or give anything by mouth to an unconscious person.

Note to doctor: No specific antidote is known. If ingested, induce emesis or lavage stomach. Administration of an aqueous slurry of activated charcoal may be considered. Apply symptomatic therapy.

3. RELEVANT SUBSTANCES:

Chemical name	
s-metolachlor	
Classification	Concentration (% w/w)
Skin Sens. 1; H317 Aquatic Acute 1; H400 Aquatic Chronic 1; H410 M-Factor (Acute aquatic toxicity): 10 M-Factor (Chronic aquatic toxicity): 10	≥ 70 - < 90
Chemical name	
benoxacor	
Classification	Concentration (% w/w)
Skin Sens. 1; H317 Aquatic Chronic 1; H410 M-Factor (Chronic aquatic toxicity): 1	≥ 2,5 - < 10

4. RESISTANCE MANAGEMENT:

DUAL GOLD is a group code 15 herbicide. Any weed population may contain individuals naturally resistant to **DUAL GOLD** and other group code 15 herbicides. The resistant individuals can eventually dominate the weed population if these herbicides are used repeatedly and exclusively in programs. **DUAL GOLD** or any other group code 15 herbicides may not control these resistant weeds.

To delay herbicide resistance:

- Avoid exclusive repeated use of herbicides from the same herbicide group code. Alternate or tank mix with products from different herbicide group codes.
- Integrate other control methods (chemical, cultural, biological) into weed control programs.

For specific information on resistance management contact the registration holder of this product.

5. USE RESTRICTIONS:

FORAGE SORGHUM

DUAL GOLD can only be used on **forage sorghum** which are *sorghum* x *sorghum* hybrids or *sorghum* x Sudan grass hybrids.

Forage sorghum hybrids with *Pennisetum* spp. or hybrids containing the BMR genes should not be sprayed with **DUAL GOLD**.

CONCEP® 960 EC seed treatment should only be used in combination with **DUAL GOLD** or METAGAN GOLD.

GREEN BEANS

DUAL GOLD is registered on green beans only for use

by McCain on the cultivars Fortè, Masai and Dark Seeded Provider. This registration is only valid in the production area of the Loskop irrigation scheme, Letsitele, Ohrigstad and certain areas of the Highveld.

DUAL GOLD may damage certain crops under the following conditions:

Maize and sweet corn
<ul style="list-style-type: none"> • Poorly drained soils. • Soils with a compaction layer. • Wet and cold conditions directly after an application. • Inbred parent plants of maize hybrids. Consult a representative of Syngenta, the distributor, or seed supplier.
Tobacco
<ul style="list-style-type: none"> • Planted on very sandy and/or gravelly soils.
Grain sorghum and forage sorghum
<ul style="list-style-type: none"> • Planted on very sandy and/or gravelly soils. • On soils with a high percentage (> 60%) fine sand and/or poor structure. These soils are inclined to compact with rain and are therefore poorly aerated. • Planted deeper than 50 mm. • On fields with a high incidence of soil borne diseases and/or where monoculture is practiced. • Planted without the seed treatment CONCEP 960 EC.
Dry beans
<ul style="list-style-type: none"> • On fields with a high incidence of soil borne diseases and/or where monoculture is practiced. • In hot, dry conditions especially in the presence of a compaction layer in the soil. Under these conditions beans might also be susceptible to wind damage. • On waterlogged, shallow, sandy soils of < 100 mm depth with an impermeable clay sub soil.
Sunflowers
<ul style="list-style-type: none"> • On waterlogged, shallow, sandy soils of < 100 mm depth with an impermeable clay sub soil.

Important: Where other herbicides are used in combination with **DUAL GOLD** the use restrictions as given on the labels of the herbicides concerned, must be adhered to.

Warning: Possible damage to triazine sensitive crops

- Where soils have been treated with lime to correct the soil pH, the possibility of crop damage increases dramatically in fields where triazines were previously applied. This is due to the triazine molecules being replaced on the clay complex with calcium cations and the triazine thus becoming more available in the soil-water complex.
- Only maize should be planted in the season directly after soil pH adjustment with lime.
- No triazine sensitive crops should be planted in the season after the soil pH adjustment has been done with lime. This applies even if triazines were used at crop rotation rates in previous years.
- Triazine sensitive crops include all broadleaf crops e.g., different bean crops, sunflowers and all cereals e.g., wheat.
- These warnings however do not guarantee that no damage would be experienced to even the following maize crop as large volumes of previously applied triazines might now be available depending on the volume of lime applied and the rainfall experienced.

Warning: Possible increased efficacy, phytotoxicity and residual action

- Increasing the soil pH levels above 7 could produce conditions for increased efficacy and reduced selectivity. This increased pH may also result in increased soil residual action by certain herbicides influencing the choice of following crops especially under irrigation.
- In situations where pH adjustments has been done, take care when sulphonyl urea herbicides, triazolopyrimidine sulfonanilide herbicides and imidazolinone herbicides, which are all sensitive to soil pH fluctuations, have been used or are about to be used.

Contact your local SYNGENTA representative to discuss crop rotation and crop protection programs to follow before embarking on any pH adjustment program.

6. WEEDS CONTROLLED:

The following weed species are normally controlled by a pre-emergence application of **DUAL GOLD** at the dosage rates indicated below:

<i>Brachiaria eruciformis</i> <i>Chloris virgata</i> <i>Dactyloctenium aegyptium</i> <i>Digitaria sanguinalis</i> <i>Echinochloa crusgalli</i> <i>Eleusine indica</i> <i>Panicum maximum</i> <i>Panicum schinzii</i> <i>Pseudobrachiaria deflexa</i> <i>Setaria pallide-fusca</i> <i>Setaria verticillata</i> <i>Tragus berteronianus</i> <i>Tragus racemosus</i> <i>Urochloa mosambicensis</i> <i>Urochloa panicoides</i>	sweet signal grass feathertop Chloris crowfoot crab finger-grass barnyard grass goose grass common buffalo grass sweet buffalo grass false signal grass red bristle grass sticky bristle grass small carrot seed grass large carrot seed grass bushveld herringbone grass herringbone grass
Control of the following weeds is variable:	
<i>Amaranthus hybridus</i> <i>Amaranthus spinosus</i> <i>Amaranthus thunbergii</i> <i>Chenopodium carinatum</i> <i>Cleome monophylla</i> <i>Commelina benghalensis</i> <i>Cyperus esculentus</i> <i>Datura ferax</i> <i>Datura stramonium</i> <i>Galinsoga parviflora</i> <i>Nicandra physaloides</i> <i>Portulaca oleracea</i>	Common pigweed thorny pigweed red pigweed green goosefoot spindle pod Bengal wandering Jew yellow nutsedge large thorn apple thorn apple gallant soldier Apple of Peru purslane

IMPORTANT:

YELLOW NUTSEDGE (*Cyperus esculentus*)

The suppression of *Cyperus esculentus* can be improved provided the following conditions are met:

- Thorough ploughing with a mould board plough immediately before planting.
- A fine, even and firm seedbed is prepared.

The **DUAL GOLD** application is followed by at least 10 - 20 mm of soft penetrating rain (or irrigation) to leach

DUAL GOLD into the soil prior to the emergence of *C. esculentus* (normally 7 - 10 days after ploughing). These conditions are more likely to occur during the latter half of the planting season. More rain or irrigation is required on heavier soils to obtain good results. This is the reason for the very poor control sometimes obtained on turf soils.

- Rain after the **DUAL GOLD** application but before the *C. esculentus* emergence is imperative for optimal *C. esculentus* control. Therefore, **DUAL GOLD** should be applied directly after the planting process in moist soil.
- When planting into dry soil (insufficient moisture for *C. esculentus* germination) application of **DUAL GOLD** should be timed as close as possible to, but definitely before the first rains.

BUSHVELD HERRINGBONE GRASS AND HERRINGBONE GRASS (*Urochloa* spp.)

Urochloa species germinate very shallow and in cases where no tillage or minimum tillage happen poor control of *Urochloa* species may be experienced due to this shallow germination and even germination on the soil surface as well as the lack of seed incorporation into the soil profile.

7. DIRECTIONS FOR USE: Use only as indicated.

7.1 Compatibility

The compatibility of **DUAL GOLD** with other products may be influenced by the formulation of the products involved as well as the quality of the water. Since the formulation of other products may change without the knowledge of Syngenta and the quality of water may vary from farm to farm, a physical compatibility test should always be carried out prior to application.

DUAL GOLD (L5749) is compatible with CALLISTO (L6795), COMPLEMENT SUPER (L8169), GARDOMIL® GOLD (L6246), GESAPRIM SUPER (L3914), COTOGARD® 500 SC (L1446), SORGOMIL® GOLD 600 SC (L6221), GESAPRIM 90 WG (L4764), HAMMER® 100 SL (L5201), IGRAN® 500 SC (L0324), KARATE ZEON (L6330), SENCOR® 480 SC (L3034), GRAMOXONE® (L1174), TOUCHDOWN FORTE HITECH (L7305), MCPA, and 2,4-D amine as recommended on this label.

7.2 Mixing Instructions

- Half-fill the spray tank with water, then pour the required amount of **DUAL GOLD** into the spray tank while the water is being stirred. Top-up with water to the final volume required.
- When **DUAL GOLD** is tank mixed with other products as recommended, soluble concentrates should be added to the water first. **DUAL GOLD** should then be added last, just before the required volume is reached.
- When GRAMOXONE or TOUCHDOWN FORTE HITECH is included in a tank mixture it should be added last, only after all the other products including **DUAL GOLD** have been added and properly mixed just prior to the final volume being obtained.
- Ensure thorough agitation of the mixture in the tank during mixing and spraying.
- Tank mixtures must be sprayed out immediately and not

allowed to stand in the spray tank.

7.3 Application Techniques

7.3.1 Ground application

DUAL GOLD may be applied with any medium- or high-volume sprayer, properly calibrated, and which is equipped with an efficient agitation mechanism. Choice and arrangement of spray nozzles should be such as to ensure even distribution and optimal recovery of the herbicide. The recommended amount of **DUAL GOLD** should be applied in at least 200 ℓ water/ha.

7.3.1.1 Post plant pre-emergence

When planting into moist soil, **DUAL GOLD** must be applied within three (3) days of planting (but preferably at planting) on a fine, even, firm and freshly prepared weed free seedbed. To obtain good results it is necessary that rain or irrigation follows application before the weeds emerge. If rainfall does not occur in time and weeds begin to emerge and develop, a shallow cultivation must be carried out to destroy these weeds and to mix the herbicide with the top 10 - 20 mm of soil.

When planting into dry soil (insufficient moisture for germination), **DUAL GOLD** must be applied as close to, but definitely before the first rain. Emerged weeds at the time of application will not be controlled.

7.3.1.2 Pre-plant incorporated (Maize only)

In order to obtain more reliable control of *C. esculentus*, **DUAL GOLD** can be incorporated shallow into the soil prior to planting. This incorporation may be done with a Kongskilde Triple K, a field span cultivator or similar implement. A roller should in each case be fitted to the rear of the implement. The working depth of the implement should be 75 - 100 mm in order to ensure effective incorporation into the top 37 - 50 mm of soil. To further ensure proper mixing of the **DUAL GOLD** with the soil, incorporation should be done at a speed of 9 - 11 km/h. Proper primary seedbed preparation should precede the incorporation of **DUAL GOLD**. The incorporation of **DUAL GOLD** in the latter half of the planting season is not recommended, sufficient results will be obtained from the pre-emergence application.

Although the incorporation of **DUAL GOLD** may result in more reliable control of *C. esculentus* during the drier first half of the planting season some rain is still required to moisten the top soil to allow the **DUAL GOLD** to be absorbed by the weeds. However, less rain is required than after a pre-emergence application after planting.

7.3.1.3 Crop post-emergence (Maize, sweet corn and potatoes)

DUAL GOLD has very limited post-emergence effect. It may however be applied post-emergence of the crop immediately after cultivation i.e., when no weeds are present. Weeds that are present after the cultivation will not be controlled.

7.3.2 Aerial application (Pre- and post-emergence)

Aerial application of this product may only be done by a registered aerial application operator using a correctly calibrated, registered aircraft according to the instructions of SANS 10118 (Aerial Application of Agricultural Remedies). It is important to ensure that the spray mixture is distributed evenly over the target area and that the loss of spray material during application is restricted to a minimum. It is therefore that the following criteria be met:

a) Application parameters:

- **Volume:** A volume of 30 - 40 ℓ/ha is recommended for pre- and post-emergence applications. As this product has not been evaluated at a reduced volume rate, the registration holder cannot guarantee efficacy or be held responsible for any adverse effects if the product is applied aurally at a lower volume rate than recommended above.
- **Droplet coverage:** A droplet coverage of 20 - 30 droplets/cm² must be recovered at the target when applied pre-emergence and 30 - 45 droplets/cm² when applied post-emergence.
- **Droplet size:** A droplet spectrum with a VMD of 350 - 400 microns is recommended for a pre-emergence application and 300 - 350 microns for a post-emergence application. Ensure that the production of fine droplets (less than 150 microns - high drift and evaporation potential) is restricted to a minimum.
- **Flying height:** The height of the spray boom should be maintained at 3 - 4 meters above the target. Do not spray when aircraft is in a climb, at the top, during a dive, or when banking.

b) Equipment:

- Use suitable atomizing equipment (hydraulic nozzles or rotary atomizers) that will produce the desired droplet size and coverage but which will ensure the minimum loss of product either through endodrift (within target field) or exodrift (outside target field).
- The operator must use a setup that will produce a droplet spectrum with the lowest possible relative span.
- All nozzles/atomizers should be positioned within the inner 60 - 75% of the wingspan to prevent droplets from entering the wingtip vortices.

c) Meteorological conditions:

- The difference in temperature between the wet and dry bulb thermometers, of a whirling hygrometer, should not exceed 8°C. The addition of a suitable anti-evaporant is recommended if the VMD of the droplets is less than 200 - 250 microns.
- Stop spraying if the wind speed exceeds 15 km/h or reduces to less than 5 km/h.
- Aerial application of this product must not be done under turbulent, unstable conditions during the heat of the day when rising thermals and downdraughts occur.
- Also note that the application of this product under temperature inversion conditions (spraying in or above the inversion layer) may lead to the following:
 - Reduced efficacy due to suspension and evaporation of small droplets in the air (inadequate coverage).
 - Damage to other sensitive crops and or non-target areas through the movement of the suspended spray cloud away from the target field.

DUAL GOLD may be applied aurally in a tank mixture

with either CALLISTO (pre-emergence only) or GARDOMIL GOLD or GESAPRIM SUPER or GESAPRIM 90 WG provided that the spray mixture is distributed evenly over the target area and the loss of spray material during application is restricted to a minimum.

It is essential to obtain assurance from the aerial spray operator that the above requirements are met.

7.3.3 Center pivot irrigation application

DUAL GOLD may be applied in irrigation water pre-emergence (after planting but before weeds or crop emerge) at rates recommended on this label.

- Use only center pivot systems that apply water uniformly.
- Prepare a mixture with a minimum of one (1) part of water to one (1) part herbicide and inject this mixture into the center pivot system using a positive displacement pump. Injecting a larger volume of a more dilute mixture per hour will usually provide more accurate calibration of metering equipment.
- Maintain sufficient agitation to keep the herbicide in suspension.
- Apply in 12.5 - 25 mm of water. Use the lower water volume (12.5 mm) on coarser textured soils and the higher volume (25 mm) on finer textured soils. More than 25 mm of water at application may reduce weed control by moving the herbicide below the weed germination zone in the soil.

Precautions for center pivot applications

- Apply only through irrigation systems containing anti-siphon and check valves to prevent contamination of the well during shutdown and overflow of solution tank.
- Inject ahead of any right angle turn in the main line to ensure adequate mixing.
- Chemical injection pumps and water pumps must have interlocking controls to insure simultaneous shut-off.
- Application when drift may occur, such as from windy conditions, or when system joints and connections are leaking, or when nozzles are not providing uniform distribution, may cause crop injury.
- Where sprinkler distribution patterns do not overlap sufficiently this may result in poor weed control. Where sprinkler distribution patterns overlap excessively, crop injury or unacceptable residues may result.

7.4 Recommendations and Application Rates

7.4.1 Maize and sweetcorn

7.4.1.1 Pre-emergence application of **DUAL GOLD** in combination with different products.

DUAL GOLD may be applied immediately following planting, but pre-emergence with respect to maize, sweet corn and weeds or it may be shallowly incorporated into the soil just prior to planting. It may also be applied post-emergence after cultivation.

Where yellow nutsedge (*Cyperus esculentus*) constitutes an important part of the weed population and planting

commences during the first half of the planting season (prior to 20 October), it is recommended that a shallow incorporation of **DUAL GOLD** be carried out. Where yellow nutsedge is not a problem or where planting only commences during the second half of the planting season (after 20 October) the incorporation of **DUAL GOLD** is not recommended.

Since broadleaf weeds are inadequately controlled by **DUAL GOLD**, the use of a broadleaf herbicide in combination with **DUAL GOLD** is recommended. The broadleaf herbicide may be applied pre- or post-emergence. As post-emergence treatments afford more effective and also more reliable control of especially deep germinating broadleaf weeds such as *Datura* spp., *Xanthium* spp., *Tribulus terrestris*, *Commelina benghalensis* and *Cucumis myriocarpus* post-emergence treatments are preferred. The different combinations, which may be used, are indicated in the following tables.

TABLE 1: THE APPLICATION RATE OF DUAL GOLD PLUS GARDOMIL GOLD APPLIED PRE-EMERGENCE AS A TANK MIXTURE:

Soil type	% clay	Pre-emergence	
		DUAL GOLD (ℓ/ha) plus	GARDOMIL GOLD (ℓ/ha)
Sand	0 - 10	0.4 - 0.65	2.2
Loamy sand/ sandy loam	11 - 20	0.4 - 0.65	2.5
Sandy clay loam	21 - 30	0.5 - 0.7	3.2
Sandy clay loam/ sandy clay	31 - 40	0.6 - 0.7	4.0
Sandy clay/turf	41 - 50	0.6 - 0.8	4.8

To control *Cyperus esculentus* **DUAL GOLD** can be incorporated at the rates in table 1 followed by a pre-emergence application of GARDOMIL GOLD at or directly after planting.

TABLE 2: THE APPLICATION RATE OF DUAL GOLD PLUS EITHER GESAPRIM SUPER OR GESAPRIM 90 WG APPLIED PRE-EMERGENCE IN A TANK MIXTURE:

Soil type	% clay	DUAL GOLD (ℓ/ha) plus	Pre-emergence	
			either GESAPRIM SUPER (ℓ/ha)	or GARDOMIL GOLD (ℓ/ha)
Sand	0 - 10	0.7 - 0.9	1.3 - 1.7	0.9 - 1.1
Loamy sand/ sandy loam	11 - 20	0.7 - 0.9	1.7 - 2.1	0.9 - 1.4
Sandy clay loam	21 - 35	0.9 - 1	2.1 - 2.5	1.4 - 1.7
Sand clay loam/ sandy clay/turf	> 35	1 - 1.2	2.5 - 3.3	1.7 - 2.2

Important:

- Consult the GESAPRIM SUPER and GESAPRIM 90 WG labels for crop rotation recommendations.

- Use the higher rates of GESAPRIM SUPER and GESAPRIM 90 WG where longer residual action with regard to broadleaf weeds is required, especially those that germinate late in the season such as khaki weed (*Tagetes minuta*) and large thorn apple (*Datura ferox*). Where khaki weed is the main problem GESAPRIM SUPER is preferred and GESAPRIM 90 WG where thorn apple is the major problem.

TABLE 3: THE APPLICATION RATE OF DUAL GOLD APPLIED PRE-EMERGENCE IN A TANK MIXTURE WITH CALLISTO FOR PRE-EMERGENCE GRASS AND BROADLEAF CONTROL:

DUAL GOLD can be used in combination with **CALLISTO** (L6795) at rates ranging from 218 mℓ/ha - 710 mℓ/ha to control grasses and broadleaf weeds. When **DUAL GOLD** is used in combination with **CALLISTO** the rate of **DUAL GOLD** is not clay dependant but weed dependent.

This pre-emergence application should be followed up with post-emergence applications of registered mixtures of **CALLISTO**, **GARDOMIL GOLD**, **METAGAN GOLD** or **GESAPRIM SUPER** approximately 5 - 6 weeks later as indicated on these registered labels.

CALLISTO 156 mℓ/ha plus	DUAL GOLD 320 - 710 mℓ/ha
Botanical name	Common name
<i>Acanthospermum hispidum</i> <i>Chenopodium album</i> <i>Chenopodium carinatum</i> <i>Echinochloa colona</i> <i>Nicandra physaloides</i> <i>Physalis angulata</i> <i>Setaria pallide-fusca</i> <i>Tagetes minuta</i>	upright starbur white goosefoot green goosefoot marsh grass apple-of-Peru wild gooseberry red bristle grass khaki weed

CALLISTO 156 mℓ/ha plus	DUAL GOLD 426 - 710 mℓ/ha
The above-mentioned weeds plus	
Botanical name	Common name
<i>Eleusine indica</i> <i>Panicum schinzii</i>	goose grass sweet buffalo grass

CALLISTO 208 mℓ/ha plus	DUAL GOLD 426 - 710 mℓ/ha
The above-mentioned weeds plus	
Botanical name	Common name
<i>Amaranthus hybridus</i> <i>Brachiaria eruciformis</i> <i>Datura ferox</i> <i>Eragrostis curvula</i> <i>Hibiscus trionum</i> <i>Polygonum aviculare</i>	common pigweed sweet signal grass large thorn apple weeping love grass bladder weed prostrate knotweed

CALLISTO 208 mℓ/ha plus	DUAL GOLD 568 - 710 mℓ/ha
The above-mentioned weeds plus	
Botanical name	Common name
<i>Cleome monophylla</i>	spindle pod

CALLISTO 208 mℓ/ha plus	DUAL GOLD 568 - 710 mℓ/ha
The above-mentioned weeds plus	
Botanical name	Common name
<i>Commelina benghalensis</i> <i>Digitaria sanguinalis</i> <i>Hibiscus cannabinus</i> <i>Triumfetta pilosa</i>	Benghal wandering Jew large thorn apple crab fingergrass kenaf

CALLISTO 260 mℓ/ha plus	DUAL GOLD 710 mℓ/ha
The above-mentioned weeds plus	
Botanical name	Common name
<i>Urochloa panicoides</i> <i>Xanthium strumarium</i>	herringbone grass cocklebur
Only suppression of	
Botanical name	Common name
<i>Bidens bipinnata</i> <i>Bidens pilosa</i> <i>Citrullus lanatus</i> <i>Cosmos bipinnatus</i> <i>Crotalaria sphaerocarpa</i> <i>Cyperus esculentus</i> <i>Ipomoea purpurea</i> <i>Portulaca oleracea</i> <i>Tribulus terrestris</i>	Spanish blackjack blackjack bitter apple cosmos mealie Crotalaria yellow nutsedge common morning glory purslane dubbeltjie

Consult the **CALLISTO** label for detailed recommendations.

7.4.1.2 The pre-emergence application of **DUAL GOLD** followed by a post-emergence application of different products.

TABLE 4: THE APPLICATION RATE OF DUAL GOLD APPLIED PRE-EMERGENCE OR PRE-PLANT INCORPORATED FOLLOWED BY GARDOMIL GOLD EARLY POST-EMERGENCE:

Soil type	% clay	Pre-emergence followed by	Post-emergence
		DUAL GOLD (ℓ/ha)	GARDOMIL GOLD (ℓ/ha)
Sand	0 - 10	0.5 - 0.65	2.3
Loamy sand/ sandy loam	11 - 20	0.5 - 0.65	2.8
Sandy clay loam	21 - 30	0.65 - 0.8	3.2
Sandy clay loam/sandy clay	31 - 40	0.75 - 0.9	3.2 - 4.8
Sandy clay/turf	41 - 50	0.8 - 1	3.2 - 4.8

Important:

COMPLEMENT SUPER at 100 mℓ/ha must be added to this post-emergence spray mixture.

7.4.1.3 Crop rotation

The above-mentioned quantities of **GARDOMIL GOLD** recommended in tables 1, 2 and 3 may damage triazine sensitive follow-up crops e.g., groundnuts, dry beans,

soybeans, sunflowers, wheat, vegetables, cotton and tobacco. Where these crops are planted as follow-up crops the application rate of GARDOMIL GOLD should not exceed 2.2 l/ha (table 4) or GESAPRIM SUPER should not exceed 1.7 l/ha (table 5).

In crop rotation situations **DUAL GOLD** and GARDOMIL GOLD can be applied in a tank mix pre-emergence of the maize and the weeds. However, if **DUAL GOLD** is incorporated before planting the GARDOMIL GOLD should be applied pre-emergence of both the crop and the weed according to the rates in table 4.

TABLE 5: THE APPLICATION RATE OF DUAL GOLD PLUS GARDOMIL GOLD APPLIED PRE-EMERGENCE AS A TANK MIXTURE OR PRE-PLANT INCORPORATED APPLICATION OF DUAL GOLD FOLLOWED BY PRE-EMERGENCE APPLICATION OF GARDOMIL GOLD TO FACILITATE CROP ROTATION:

Soil type	% clay	DUAL GOLD (l/ha)	GARDOMIL GOLD (l/ha)
Sand/ loamy sand/sandy loam	0 - 20	0.5 - 0.65	2.2
Sandy clay loam	21 - 30	0.6 - 0.8	2.2
Sandy clay loam/sandy clay	31 - 40	0.8 - 0.9	2.2
Sandy clay/turf	41 - 50	0.9 - 1.1	2.2

TABLE 6: THE APPLICATION RATE OF DUAL GOLD APPLIED PRE-EMERGENCE OR PRE-PLANT INCORPORATED FOLLOWED BY AN EARLY POST-EMERGENCE APPLICATION OF GESAPRIM SUPER PLUS 2,4-D AMINE:

Soil type	% clay	Pre-emergence followed by	Post-emergence
		DUAL GOLD (l/ha)	GESAPRIM SUPER + 2,4-D amine (480 g ai/l)
Sand/loamy sand/sandy loam	0 - 20	0.7 - 0.9	All soil types: either 1.25 l GESAPRIM SUPER + 0.75 l 2,4-D amine or 1.7 l GESAPRIM SUPER + 0.5 l 2,4-D amine
Sandy clay loam	21 - 30	0.8 - 1	
Sandy clay loam/sandy clay	31 - 40	0.95 - 1.1	
Sandy clay/turf	41 - 50	0.95 - 1.3	

Do not add COMPLEMENT SUPER (or any other adjuvant) to the GESAPRIM SUPER plus 2,4-D amine mixture.

REMARKS TABLES 1 - 6:

SWEETCORN

- Do not use GARDOMIL GOLD as follow-up application or in combination with **DUAL GOLD** on sweetcorn. Use only the recommendations in table 6.

WEEDS

WEEDS cont.

Cyperus esculentus

- Use the higher application rates of **DUAL GOLD** for improved control.
- Where EPTC is used for the control of yellow nutsedge (*C. esculentus*) and grasses, improved late season control of these weeds can be obtained if EPTC is followed by an early post-emergence application of a **DUAL GOLD** plus GARDOMIL GOLD tank mixture. EPTC should be used as recommended on the label. Use the higher application rates of **DUAL GOLD** for improved control.

Digitaria sanguinalis

- Use the higher application rates of **DUAL GOLD** where heavy infestations exist.

Brachiaria eruciformis

- Use the higher application rates of **DUAL GOLD** for good control.

Application methods - incorporation

- Use the higher application rates when **DUAL GOLD** is pre-plant incorporated.

SOILS

- Use the higher application rates of **DUAL GOLD** where organic matter in the soil exceeds 1%.
- On soils containing more than 30% clay broadleaf weeds may not be controlled satisfactorily pre-emergence (table 1) and preference should be given to post-emergence control of broadleaf weeds (tables 3 and 4).
- On soils containing more than 30% clay where the **DUAL GOLD** plus GARDOMIL GOLD split treatment is selected, the rate of GARDOMIL GOLD can be varied according to the degree of pre-emergence control achieved and the prevailing weather conditions.
- On soils with 0 - 10% clay in the North West Province and North Western Free State or on calcareous soils the low rates of GARDOMIL GOLD (table 5) may still damage follow-up crops.
- These low rates may result in poorer broadleaf control and shorter residual effect on soils with more than 20% clay (table 5). Thus post-emergence control of broadleaf weeds as recommended in table 4 is preferred when crop rotation with sensitive crops is practiced.

Adjuvants

COMPLEMENT SUPER at 100 ml/ha must be added to the spray mixture when GARDOMIL GOLD is applied post-emergence.

Mode of action

Grass killers belonging to the α -chloroacetamide group of herbicides (that includes **DUAL GOLD**) are absorbed via the coleoptiles of grass weeds. Therefore, for good grass control the herbicide needs to be present at lethal concentrations in the top \pm 50 mm of the soil profile.

The adsorptive capacity of a soil for these herbicides, as well as the amount of water that moves through the soil profile with rain/irrigation, determine the resultant concentration of these herbicides in the top layers of the soil profile.

As a result of the low adsorption capacity of sandy soils (0 - 15% clay, < 1% organic matter) the amount of these herbicides can be reduced to sub-lethal concentrations in the top \pm 50 mm after the occurrence of permeating rain (25 mm and more within one (1) day).

Persistent rain (50 mm and more distributed over 3 - 7 days) will have the same result. It can therefore happen that grasses germinate if such conditions prevail. A split

application (as recommended in table 4) is recommended if **DUAL GOLD** is used on such soils. Permeating and/or persistent rain after the split application will have the same result.

Consult the GARDOMIL GOLD and GESAPRIM SUPER labels for additional information.

7.4.1.4 The use of **DUAL GOLD** in combination with products to control *Cyperus esculentus*

TABLE 7: THE APPLICATION RATE OF DUAL GOLD APPLIED EARLY POST-EMERGENCE IN A TANK MIXTURE WITH GARDOMIL GOLD AFTER INITIAL APPLICATION OF EPTC:

Soil type	% clay	Earlu Post-emergence	
		DUAL GOLD (ℓ/ha) plus	GARDOMIL GOLD (ℓ/ha)
Sand	0 - 10	0.55	2.2
Loamy sand/sandy loam	11 - 20	0.5	2.5
Sandy clay loam	21 - 30	0.6	3.2

Important: COMPLEMENT SUPER at 100 ml/ha must be added to this post-emergence spray mixture.

7.4.1.5 The use of **DUAL GOLD** in combination with different products to improve initial broadleaf control.

In order to improve the variable initial broadleaf control of **DUAL GOLD** it can be used pre-emergence in a tank mixture with GARDOMIL GOLD followed early post-emergence with GARDOMIL GOLD.

TABLE 8: THE APPLICATION RATE OF DUAL GOLD APPLIED PRE-EMERGENCE IN A TANK MIXTURE WITH GARDOMIL GOLD FOR MORE RELIABLE INITIAL BROADLEAF CONTROL:

Soil type	% clay	Pre-emergence		Early post-emergence
		DUAL GOLD (ℓ/ha) plus	GARDOMIL GOLD (ℓ/ha) followed by	GARDOMIL GOLD (ℓ/ha)
Sand/loamy sand/sandy loam	0 - 20	0.65	0.8	2
Sandy clay loam	21 - 30	0.75	1	2.2
Sandy clay loam/sandy clay	> 30	0.9	1.2	2.8

Important: COMPLEMENT SUPER at 100 ml/ha must be added to the spray mixture when GARDOMIL GOLD is applied post-emergence.

7.4.1.6 The use of **DUAL GOLD** in stale seedbeds or minimum tillage or stubble mulch.

Maize, sweetcorn and grain sorghum

Where minimum tillage or stubble mulch is practiced, weeds

may have emerged at the time of planting. If crops are planted under such conditions or into a stale seedbed, where grass weeds have already emerged and/or the broadleaf weeds have developed beyond the seedling stage, it is recommended that either TOUCHDOWN FORTE HITECH or GRAMOXONE be added to **DUAL GOLD** according to the recommendations of the manufacturer. The TOUCHDOWN FORTE HITECH or GRAMOXONE will destroy the emerged weeds and create a pre-emergence situation for the **DUAL GOLD** to act.

When TOUCHDOWN FORTE HITECH or GRAMOXONE is added, spraying should be carried out prior to emergence of the crop, as TOUCHDOWN FORTE HITECH or GRAMOXONE will damage the crop if it is applied post-emergence. In the case of minimum tillage or stubble mulch the density of the stubble and humus may affect the efficacy of **DUAL GOLD**. Therefore consult a representative of Syngenta or distributor.

Important: All dosage rates given above apply to full cover sprays. In the case of band treatment over the rows the corresponding amount of herbicide should be calculated in accordance with the band and row widths. Ensure that the crop is properly fertilised to ensure vigorous seedling growth.

7.4.2 Groundnuts, green beans, dry beans, kidney beans, sunflowers, soybeans and lupines

7.4.2.1 Pre-emergence **DUAL GOLD** applications rates in different broadleaf crops.

TABLE 9: THE APPLICATION RATE OF DUAL GOLD FOR THE DIFFERENT BROADLEAF CROPS ON VARIOUS SOIL TYPES AND FOR THE CONTROL OF CERTAIN WEEDS:

Soil type	% clay	Pre-emergence
		DUAL GOLD (ℓ/ha)
Sand/loamy sand/sandy loam	0 - 20	0.6 - 0.8
Sandy clay loam	21 - 30	0.8 - 1
Sandy clay loam/sandy clay	> 30	1 - 1.3

Use the higher application rate of **DUAL GOLD** for improved control of yellow nutsedge (*C. esculentus*) or where heavy infestations of crab finger-grass (*D. sanguinalis*) exist or where the organic matter in the soil exceeds 1%.

Important: Groundnuts only

- To obtain good broadleaf control, IGRAN 500 SC may be added to **DUAL GOLD** at the rates indicated on the IGRAN 500 SC label as per soil type.
- IGRAN 500 SC is only recommended where overhead sprinkler irrigation is practiced.

7.4.2.2 Tank mixtures with **DUAL GOLD** and HAMMER 100 SL on different crops.

TABLE 10: THE APPLICATION RATE OF DUAL GOLD IN A TANK MIXTURE WITH HAMMER 100 SL ON DRY BEANS FOR THE CONTROL OF CERTAIN WEEDS:

TABLE 10 cont.

Soil type	% clay	Pre-emergence	
		DUAL GOLD (ℓ/ha)	HAMMER 100 SL (ℓ/ha)
Sand/loamy sand	0 - 15	0.6	0.3
Sandy loam/sandy clay loam	16 - 25	0.6	0.4
Sandy clay loam/sandy clay	26 - 35	0.8	0.5
Sandy clay/turf	> 35	NOT RECOMMENDED	

7.4.2.3 Tank mixtures with **DUAL GOLD** and HAMMER 100 SL on groundnuts and soybeans.

TABLE 11: THE APPLICATION RATES DUAL GOLD IN A TANK MIXTURE WITH HAMMER 100 SL ON GROUNDNUTS AND SOYBEANS FOR THE CONTROL OF CERTAIN WEEDS:

Soil type	% clay	Pre-emergence	
		DUAL GOLD (ℓ/ha)	HAMMER 100 SL (ℓ/ha)
Sand/loamy sand/sandy loam	0 - 25	0.5 - 0.8	0.4
Sandy clay loam/sandy clay	26 - 35	0.8 - 1	0.5
Sandy clay/turf	> 35	NOT RECOMMENDED	

REMARKS TABLES 10 - 11:

- A tank mixture of **DUAL GOLD** plus HAMMER 100 SL may damage the crop when used on a soil with a pH of more than 7.
- The control of certain weeds may be detrimentally affected under the following conditions:
 - A poorly prepared seedbed.
 - Soils with a pH (H₂O) of less than 5.
 - Dry conditions directly after application or a lack of sufficient rain on heavy soils.
- Consult the HAMMER 100 SL label for full details.

7.4.2.4 Tank mixtures with **DUAL GOLD** and SENCOR 480 SC on soybeans.

The following application rates as tank mixtures of **DUAL GOLD** plus SENCOR 480 SC are recommended on soybeans on various soil types and for the control of certain weeds as indicated on the SENCOR 480 SC label, additional to that controlled by **DUAL GOLD**.

TABLE 12: THE APPLICATION RATES OF DUAL GOLD IN A TANK MIXTURE WITH SENCOR 480 SC ON SOYBEANS:

Soil type	% clay	Pre-emergence	
		DUAL GOLD (ℓ/ha)	SENCOR 480 SC (ℓ/ha)
Sand	0 - 10	NOT RECOMMENDED	
Loamy sand/sandy loam	11 - 20	0.6 - 0.8	0.54
Sandy clay loam	21 - 35	0.8 - 1	0.7

TABLE 12 cont.

Sand clay loam/sandy clay/turf	> 35	NOT RECOMMENDED
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REMARKS TABLE 12:

- Use the higher application rate of **DUAL GOLD** to improve the control of *C. esculentus* (yellow nutsedge).
- Use the **DUAL GOLD** plus SENCOR 480 SC mixture only on soils with more than 1% organic matter.
- See SENCOR 480 SC label for cultivars restrictions.
- Do not apply **DUAL GOLD** plus SENCOR 480 SC on soybeans, which are planted on soils with exceptionally low, or high pH (H₂O) values (lower than 4,5 and higher than 7), or on soils with mineral deficiencies or on waterlogged soils as damage might occur.
- The application of **DUAL GOLD** plus SENCOR 480 SC on light soils early in the season under conditions of low night temperatures may cause damage.
- Over-application, application at the incorrect growth stage, or any other use not in accordance with the directions on the **DUAL GOLD** and SENCOR 480 SC labels, may cause stunting of the crop and other adverse effects.
- Consult the SENCOR 480 SC label for full details.

7.4.3 Potatoes

(Summer rainfall region only)

- Apply 1.3 ℓ/ha **DUAL GOLD** on all soil types.
- To obtain good broadleaf weed control SENCOR 480 SC may be added to **DUAL GOLD** at a rate of 1,1 ℓ/ha.
- When used in combination with SENCOR 480 SC, the rate of **DUAL GOLD** may be lowered to 1 ℓ/ha where potatoes are planted during the rainy season or under irrigation.
- Where potatoes are planted on dry land, prior to the start of the rainy season, the higher rate of **DUAL GOLD** should be applied even when used in combination with SENCOR 480 SC.

The restrictions with regard to SENCOR 480 SC as indicated on its label must be observed.

Ridging: After herbicide application, ridging should be delayed as long as possible since untreated soil is brought to the surface by this operation, which may result in a new flush of weed growth. **DUAL GOLD** can also be applied post-emergence to the potatoes after ridging. Under these circumstances a directed application is preferable although not essential.

7.4.4 Cotton

Apply **DUAL GOLD** at a rate of 0.5 - 0.6 ℓ/ha **only in tank mixture with COTOGARD 500 SC**. At this low rate *Cyperus esculentus* and *Panicum maximum* will not be well controlled. The detailed recommendations are given on the COTOGARD 500 SC label.

Important: Where **DUAL GOLD** is sprayed onto uncovered cottonseed it may cause damage. Therefore, ensure proper coverage of the cottonseed with soil.

7.4.5 Grain and Forage Sorghum

DUAL GOLD may be used in grain sorghum and forage

sorghum **provided the sorghum seed has been properly treated as prescribed with CONCEP® 960 EC**. The following application rates are recommended for the control of annual grasses and partial control of *Cyperus esculentus*.

DUAL GOLD can only be used on **forage sorghum** which are *sorghum x sorghum* hybrids and *sorghum x Sudan grass* hybrids. Forage sorghum hybrids with *Pennisetum* spp. or hybrids containing the BMR-genes should not be sprayed with **DUAL GOLD**. CONCEP® 960 EC seed treatment should only be used in combination with **DUAL GOLD** or METAGAN GOLD.

TABLE 13: THE APPLICATION RATES OF DUAL GOLD WHEN APPLIED ON CONCEP 960 EC TREATED SORGHUM (REFER TO THE CONCEP LABEL FOR THE TREATMENT AND RATES USED):

Soil type	% clay	Pre-emergence
		DUAL GOLD (ℓ/ha)
Sand/loamy sand/ sandy loam	0 - 20	NOT RECOMMENDED
Sandy clay loam	21 - 30	0.8
Sandy clay	31 - 40	0.95
Turf	> 40	0.95 - 1.3

Important:

- On turf soils, *Brachiaria eruciformis* may require 1.3 ℓ/ha of **DUAL GOLD** for good control. It may also improve the control of *Cyperus esculentus*.
- Use the higher application rates of **DUAL GOLD** where heavy infestations of *Digitaria sanguinalis* (crab finger grass) exist.
- If grain and forage sorghum seed are not properly pre-treated with CONCEP 960 EC, **DUAL GOLD** will cause severe injury to the crop.
- DUAL GOLD** may temporarily damage grain and forage sorghum when high soil moisture conditions occur 4 - 6 weeks after planting. The crop will normally outgrow this injury without any detrimental effect on yield.
- If a soil crust is formed it should be broken up immediately by means of shallow cultivation.

Control of broadleaf weeds on grain sorghum only

- A tank mix of **DUAL GOLD** + SORGOMIL GOLD 600 SC at 0.5 ℓ/ha + 2.9 ℓ/ha may also be used for pre-emergence weed control in grain sorghum on soils with 21 - 30% clay and 0.6 ℓ - 3.6 ℓ/ha respectively on soils with 31 - 35% clay (consult the SORGOMIL GOLD 600 SC label).
- On all soil types a pre-emergence treatment of **DUAL GOLD** for grass control may be followed by an early post-emergence treatment of GESAPRIM SUPER plus 2,4-D amine to control the broadleaf weeds (consult the GESAPRIM SUPER label).
- An alternative after a pre-emergence treatment of **DUAL GOLD** is an early post-emergence follow-up treatment with SORGOMIL GOLD 600 SC. SORGOMIL GOLD 600 SC may only be applied from the 5-leaf stage of the grain sorghum.
- When crop rotation is practiced the SORGOMIL GOLD 600 SC rate must not exceed 2 ℓ/ha. Consult

the SORGOMIL GOLD 600 SC label. The following application rates should be used.

TABLE 14: THE APPLICATION RATES OF DUAL GOLD FOLLOWED BY SORGOMIL GOLD 600 SC TO IMPROVE BROADLEAF WEED CONTROL ON GRAIN SORGHUM:

Soil type	% clay	Pre-emergence followed by	Post-emergence
		DUAL GOLD (ℓ/ha)	SORGOMIL GOLD 600 SC (ℓ/ha)
Sand/loamy sand	0 - 15	NOT RECOMMENDED	
Sandy loam	16 - 20	0.5	2.6
Sandy clay loam	21 - 30	0.6	3
Heavier soils including turf	> 30	0.7 - 1	3

Important:

- The adjuvant COMPLEMENT SUPER should be added to all post-emergence applications except GESAPRIM SUPER plus 2,4-D amine.
- On turf soils 1 ℓ/ha **DUAL GOLD** may be required for good control of *B. eruciformis* and *D. Sanguinalis*, it can also be used for improved control of *C. esculentus*.

7.4.6 TOBACCO

(Summer rainfall region only)

- Apply **DUAL GOLD** as a full-cover spray within three (3) days after transplanting of the tobacco while the plants are still wilted.
- When **DUAL GOLD** is applied to turgid tobacco transplants the spray must be directed in such a way that it does not enter the funnel of the plant where it may damage the growing point.
- Where **DUAL GOLD** is sprayed on the leaves of actively growing tobacco scorching may occur.
- On light soils (0 -10% clay) **DUAL GOLD** must only be applied between plant rows in such a way that an unsprayed strip with a width of about 20 - 25 cm on top of the ridge (i.e., 10 cm on both sides of the plant row) is left.
- Existing weeds must be removed before **DUAL GOLD** application. This may be done mechanically or by hand or by application of GRAMOXONE immediately before transplanting. Any growing weeds present at the time of application will not be controlled.
- Where tobacco is planted on ridges, use 110° nozzles and position the nozzles between the ridges. This will ensure more even distribution of the herbicide.

In order to activate the **DUAL GOLD**, overhead irrigation of at least 10 mm but not more than 15 mm should be applied within 2 - 3 days after **DUAL GOLD** application on soils with less than 35% clay and at least 20 mm but not more than 30 mm on soils with more than 35% clay.

Only strong and healthy plants should be transplanted.

Tobacco plants with roots exposed to **DUAL GOLD** at

the time of application will be adversely affected. Ensure, therefore, that planting is done properly.

TABLE 15: THE APPLICATION RATES OF DUAL GOLD ON TOBACCO:

Soil type	% clay	Pre-emergence
		DUAL GOLD (€/ha)
Sand	0 - 10	0.5
Loamy sand/sandy loam	11 - 20	0.7
Sandy clay loam	21 - 35	1
Sandy clay	> 35	1.4

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