Test of Restoration of Guineo-Sudanian Pastures Invaded by *Chromolaena odorata* and *Hyptis suaveolens* in Benin

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Introduction *Chromolaena odorata* and *Hyptis suaveolens* are two cover plants invading pastures in Benin . They are essentially non-palatable , and were used as indicators for degraded grazinglands (Sinsin *et al* . , 1996abc) . They constitute a major handicap to the pasture management in subequatorial zones (Holou & Sinsin , 2001) especially in the breeding ranches of Bétécoucou located between guineo-sudanian and sudano-Guinean climatic zones in Benin . Improving grassland phytomass productivities and nutrient value is important for successful herbivore breeding . In an attempt to rehabilitate pastures invaded by these species , we tested the use of the selective herbicide , Garlon 2E from CAMN Ste Armel (France) , which contains trichlopyr (240 g/l) (1E= Trichlopyr 120g/l in form of salt of triethylamineand) as the active ingredient .

Plant materials , experiment and measurements Six types of pastures were used : (i) Pastures with *Andropogon schirensis* and *Hyparrhenia subplumosa* in shrubby savannas with *Terminalia macroptera ;* (ii) Pastures with *Sporobolus pyramidalis* and *Hyparrhenia subplumosa* in shrubby fallow of *Daniellia oliveri* ; (iii) Pastures with *Andropogon tectorum* and *Chromolaena odorata* in *Anogeissus leiocarpa* forest ; (iv) Pastures with *Hyptis suaveolens* and *Hyparrhenia subplumosa* in *Isoberlinia doka* forest ; (v) Post-farming pastures with *Pennisetum polystachion* and *Securinega virosa* of fallows and (vi) Pastures with *Brachiaria falcifera* in valleys of *Acacia sieberiana* . Treated pastures were selected based on *Chromolaena* and *Hyptis* weed cover rates . The experimental design was a Fisher block with 4 treatments in 3 replications on plots sized 10 m x 10 m in 50 m x 50 m area within the pasture with *A . tectorum* and *C odorata* and in pasture with *H . suaveolens* and *H . subplumosa* . Following treatments were applied : (i) 1 application of 1 L of Garlon/25 L of water per ha ; (ii) 2 applications of 1 L/25 L of water per ha every 30 days for *Chromolaena odorata* and every 45 days for *Hyptis suaveolens* ; (iii) 1 application of 1 L of Garlon/100 L of water per ha ; (iv) 2 applications of 1 L of Garlon/100 L of water per ha every 30 days for *Chromolaena odorata* and every 45 days for *Hyptis suaveolens* . Weed cover rates were estimated every three months for one year (2004-2005) . Morphological traits i .e . heights of clumps , leaf blades length , width , and leaf area were also recorded . ANOVA and Post hoc test were performed using STATISTICA 7 .0 .

Results and discussion No significant difference appeared with pastures . Data analyses indicated (i) the single application of 1 L of Garlon 2E/100 water L per ha eliminated *Chromolaena odorata* where ever its pre-treatment cover rate was less than 15% ; (ii) 2 applications of 1 L of Garlon 2E/100 L of water per ha every 30 days were effective where cover rate ranged from 15 to 35% ; (iii) application of 1 L of Garlon 2E/25 L of water per ha (i .e . , a concentrated application) followed by application of 1 L of Garlon 2E/100 L of water per ha (i .e . , a economical application) was effective where cover rate ranged from 35 to 80% ; (iv) 2 applications of 1 L of Garlon 2E/ 25 L of water per ha every 45 days are effective where cover rate ranged from 80 to 100% . The product effectiveness depends on the covering rate . Applying the economic amount consecutively to the concentrated one after 30 days could be suitable . For pastures mostly invaded by *C . odorata* (weed cover > 80%) , 2 consecutive applications of concentrated amounts every 45 days appeared to be suitable . These results corroborated previous from Lavabre (1988) on the pastures invaded by *C . odorata* and treated by glyphosate (Roundup) , trichlopyr (Garlon) or imazapyr (Arsenal) both effective . Biological control was not conclusive except with *Parenchaetes sp* . in Sri Lanka , but *Cercospora eupatorii* was effective with a closer species to *C . odorata* (Lavabre 1988) . For *H . suaveolens* , results were strong at 1L of Garlon 2E by 50 water L per ha . Two consecutive applications every 45 days are suitable . A consistent control requires replication in the 2nd year . Consecutive applications of 1L of Garlon 2E/100L H_2O/ha every 30 days might be suitable . Otherwise , *H . suaveolens* controls food crops (i .e . beans) enemies (Sinsin *et al* . 1996) .

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