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Adventitious Flora and its Behavior in Common Bean (*Phaseolus vulgaris* L.) Cultivated under Different Weed Management Methods in the Upper Katanga, DR Congo

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ABSTRACT

The search for increased productivity of common bean in Upper Katanga by controlling weed justified the study conducted on the site of Institut National Pour l'Etude et la Recherche Agronomiques (INERA, Kipopo) to Kaniameshi during the 2014-2015 cultural season. The test was carried according to a split-plot arrangement with three repetitions. Varieties constituted the main factor CODMLB001, RCB262, HM21-7 and CODMLB007 while in manual weeding; 30 and 60 DAS, unweeding and chemical weeding (3 L ha^{-1} Paraquat+3 L ha^{-1} Atrazine) spread 10 days before seedling were the secondary factor. The results showed a positive varietal effect of CODMLB007 on the yield (0.43 t ha^{-1}). Managements modes strongly influenced all the observed parameters, but the high seed yield (0.55 t ha^{-1}) was performed in row plots manually, against a slight gap (0.51 t ha^{-1}) to the chemically treated plots and finally a large gap (0.04 t ha^{-1}) for unweeded plots. No any interaction was observed for yield after combination of two factors. Furthermore, the adventitious flora was dominated by the *Cyperus rotundus* species common to all plots with a max relative frequency (12). This could be explained by biology, the action of management methods and the long monoculture, however, the active matter were applied had a short persistence period in soil. Manual weeding induced awakening dormant buds or by splitting tubers or suppression of stripping, *C. rotundus* competitor had a high impact opposite the culture and other weeds. Therefore, it would be interesting to advocate a selective post-emergence treatment catching up or combine manual weeding treatment before seedling.

Key words: Weeds, common bean, frequency, parameters, interactions

INTRODUCTION

Common bean production in South Katanga remains unsatisfactory although only two entities Moba and Lubudi provide large amounts to the province. Therefore, it is necessary to quantify the yield by 800-1000 kg ha^{-1} for small producers, against 2500 kg ha^{-1} for large producers with certified seed (Kanyenga-Lubobo *et al.*, 2012).

In crop production, Toure *et al.* (2008) point out that weeds are a significant constraint sometimes pushing farmers to a band on their fields, especially in developing countries where pressure from weeds still growing. It suits to indicate that for the same degree of infestation, unlike developed countries, the losses are important in developing countries. Mergeai (2010) revealed the part of the natural environment promoting excellence by creating new ecological niches. Furthermore, Bassene *et al.* (2012) added that small peasants knowledge of weed biology does not allow them to define the technical itinerary better.

Generally, weeds in the case of a bad control lend themselves more to competition compared to cultivated plants in rivaling their space, light, humidity, nutrients and carbon dioxide resulting in losses of yields and difficulty of the harvesting operations even see the depreciation of the useful product (Teasdale and Cavigelli, 2010). According to Mohamed (2012) common bean is relatively sensitive to the presence of weed mainly between 4-6 weeks after sowing. Seed yield losses are estimated at 90% especially if there is no any intervention. Furthermore, De Carvalho and Christoffoleti (2008) circumscribed sensitive phonological phases of culture which spread during the appearance of the first trifoliate leaf stage and pre-floral and floral corresponding to a strong mobilization of energy by the culture for the beginning of the production. Later, Amare and Mohammed (2014) have demonstrated the action of weed nuisance on relative growth rate and net rate of assimilation, thus affecting yields. According to Adigun (2001) and Kasongo (2009) in tropical areas management of weed remains manual because agriculture is mainly peasant. Besides this management mode, herbicides products reduce the frequency of interventions by weeding time savings estimated between 40-60% (Mangara *et al.*, 2014).

This study has set itself the objective of improving common bean crop production by using different weed management modes and highlighting their impact on the weed flora.

MATERIALS AND METHODS

Description of the study area: The experimentation was installed to the INERA Kaniameshi Research Station on Kipushi road to within 30 km of the city of Lubumbashi. This site is located at 1300 m altitude, 11°35'65" South latitude to 27°22'42" East longitude.

Lubumbashi city is located at 1200 m altitude with an average annual temperature of 20°C, according to Koppen classification, the climate belongs to the kind Cw6 marked by an alternation of the seasons with the rainy season (November-March), dry season (May-September) and two transition months (April-October), the annual rainfall is 1270 mm (Mpundu, 2010). In early culture was recorded amounts of the order of 3154 mm against 106.6 mm in the end of culture. Soils in Lubumbashi and those of the surrounding belong to the kind ferralsol, marked by a more advanced weathering with a pH from 4-4.5 making difficult the fixation of phosphorus with consequent increased aluminum toxicity (Tshamala, 2008). Soil analysis gave the following results: Water pH 5.1, organic matter 2.16%, available phosphorus 21.7 ppm and residual N-NO_3 9.6 kg ha^{-1}.

Concerning the vegetation, it is worth noting the existence of a small woodland of miombo appearing elsewhere in small tasks scattered here and there because of the devastating action of man whose plant succession result in the savannah (Kabulu *et al.,* 2008; Mujinya *et al*., 2011).

Four varieties of common bean from INERA Kipopo including: CODMLB 001, MLBCOD 007, M21-7 H-262 and BCR were the biological materials. In parallel, paraquat and atrazine have been used as chemical materials. Before opening of the field, a first inventory of flora was conducted starting from the line transect method as defined by Dibong and Ndjouondo (2014). Thus following species have been found:

Cyperus rotundus, *Ageratum conyzoides*, *Ageratum houstonianum*, *Bidens pilosa*, *Spilanthes oleracea*, *Nicandra physaloides*, *Commelina benghalensis, Commelina difusa*, *Tithonia diversifolia*, *Cynodon dactylon* and *Oxalis acetosella.*

The test was conducted according to the split-plot device with three repetitions, four varieties were the main factor, while the secondary factor is the three modes of weed management (unweeded treatment; Chemical weed control (3 L ha^{-1} paraquat+3 L ha^{-1} atrazine) and manual weeding; 60 and 30 DAS). Small plots measured 2×5 m, which referred to a useful total area of 334 m×m^2 as preceding the common bean crop monoculture.

However, the soil was plowed and harrowed by hoe, then stepped herbicide spreading ten days before planting to avoid inactivating the catalase for the bean seed germination process (Mick *et al*., 2014). Thought supported by Watkin and Sagar (1972) and Rahman *et al*. (2001) which emphasize that the inhibition of seed germination by reduction of root elongation and cotyledon disruption of activity depends on the type of formulation, doses, the nature of the seed coat and duration of seeds exposure to herbicides products. Sowing took place in February with two seeds per hole and spacing of 20×40 cm for a density of 1200 plants ha^{-1}, it should be noted that during culture, two floristic inventories were made in each plots starting quadrats of 1.5×1.5 m to determine the abundance-dominance of braun-blanquet and relative frequencies. Furthermore, data collection on culture were made on 20 plants due to 10 plants by center line. Growth parameters: The emergence rate, plant height at flowering (cm), development of bloom rate (%), the pod length (cm), the number of seeds per pod, the number of pods per plant, the weight of 100 grains (g) and the yield in t ha^{-1}. The R i338622.15.0 software was used for various statistical treatments which will consist of a one-way analysis of variance to determine the effects induced by each factor on the mentioned parameters then two factors to observe interactions may result from the combined action of the factor of management modes and varieties on the same observed parameters and means were separated by the Tukey HSD test.

RESULTS

Varietal influence on the growth and yield parameters: The results obtained (Table 1) revealed that only two out of eight parameters including the height and weight of 100 seeds were influenced by the variety ($p<0.05$). Moreover, the separation medium in pairs revealed differences for these parameters. However, the variety COODMLB007 stood out of three others by a height high plants (25.4 cm), unlike to low height (18.1 cm) registered by the plants of COODMLB001 variety.

Influence of management methods on the growth and yield parameters: The results of variance analysis shown in (Table 2) reveal the in fluence management methods on each parameter ($p<0.005$). However, the Tukey test showed that the plants chemically treated plots had high size

Table 1: Varietal influence on observed parameters

	Varieties				
Observed parameters	COODMLB001	RCB262	CODMLB007	HM21-7	p-values (α = 0.05)
Height (cm) at flowering	18.1±3.82^{b}	20.30±4^{b}	25.40±3.2^{A}	21.70±4.5^{b}	0.003
Flowering rate (%)	30.7±28.9^{a}	40.30±37^{a}	61.20±26.2^{a}	42.30±37^{a}	0.270
Number of pods per plant	3.0±2.63^{a}	6.00±4.5^{a}	6.00±2.26^{a}	4.00±2.74^{a}	0.145
Number of seeds per pod	4.0±4.06^{a}	6.00±4.33^{a}	3.00±2.10^{a}	4.00±3.12^{a}	0.458
100 seeds weight (g)	21.0±16.7^{b}	18.10±14.0^{b}	41.40±5.79^{a}	29.00±22^{ab}	0.016
Pod length (cm)	6.33±4.92^{a}	8.11±6.2^{a}	11.40±0.88^{a}	7.00±5.59^{a}	0.141
Weight by plot (g)	226.00±193^{a}	332.00±264^{a}	351.00±210^{a}	281.00±214^{a}	0.634
Yield (t ha^{-1})	0.28±0.24^{a}	0.41±0.3^{a}	0.43±0.26^{a}	0.35±0.3^{a}	0.159

Mean±Standard deviation, the different letters next averages indicate a significant difference after the Tukey HSD test ($p<0.05$)

Table 2: Influence of weed management methods on the observed parameters

Observed parameters	Grassing managment methods Herbicides	Unweeded	Manual weeding	p-values (α = 0.05)
Height (cm) at the flowering	23.90±4[a]	19.10±4.13[b]	B21.10±5[a]	0.035
Flowering rate (%)	61.50±30[a]	17.20±29.2[b]	52.20±23.1[a]	0.00
Number pod/plant	6.00±2.21[a]	1.00±2.23[b]	7.00±2.68[a]	0.00
Number seed/pod	6.00±2.21[a]	2.00±2.63[b]	8.00±2.31[a]	0.00
100 graines weight (g)	32.40±13[a]	11.10±16.7[b]	38.60±8.74[a]	0.00
Pod length (cm)	10.20±3.7[A]	3.58±5.29[b]	11.00±2.12[a]	0.00
Parcel weight (g)	408.00±162[a]	36.60±56.2[b]	447.00±95.1[a]	0.00
Yield (t ha^{-1})	0.51±0.20[a]	0.04±0.07[b]	0.55±0.11[a]	0.00

Mean±Standard deviation, the different letters next averages indicate a significant difference after the Tukey HSD test (p<0.05)

Table 3: Effects of two factors on the observed parameters

Management methods (A)	Varieties (B)	Yield	Weight of 100 seeds	No. of seeds	Length of pods	No. of pods	Florai rates	Height
Herbicides	CODMLB001	0.3±0.2[a]	17.0±14.7[a]	3.0±2.9[a]	5.7±5.13[a]	3.0±2.89[a]	44.30±45[a]	20.0±1.5[a]
	RCB262	0.6±0.19[a]	28.0±2.80[a]	8.0±1.0[a]	12.0±2[bc]	8.0±1[b]	84.30±5.1[a]	23.0±4.73[a]
	HM21-7	0.5±0.06[a]	B.0±44 4.62[a]	6.0±0.0[a]	12.0±1[b]	6.0±0.0[b]	62.70±26[a]	27.0±2.0[a]
	CODMLB007	0.6±0.1[a]	41.0±3.4[b]	7.0±0.5[ab]	11.3±1.15[b]	7.0±0.57[b]	54.70±32[a]	25.0±4.2[a]
Manual weeding	CODMLB001	0.5±0.1[a]	38.0±1.3[ab]	9.0±3.1[ab]	10.0±1.73[ab]	5.0±1.52[a]	33.60±5[a]	17.0±2.08[a]
	RCB262	0.6±0.09[a]	26.0±1.9[a]	9.0±1[ab]	12.0±1.5[c]	9.0±2.6[bc]	37.00±10[a]	20.0±2.08[a]
	HM21-7	0.6±0.01[a]	43.0±5.2[ab]	6.0±1.73[a]	9.0±2.65[a]	5.0±0.57[a]	64.30±3[a]	20.0±2.89[a]
	CODMLB007	0.6±0.21[a]	48.0±0.57[b]	7.0±2.5[a]	12.0±1[c]	7.0±3.61[b]	74.00±14[a]	28.0±2.65[a]
Unweeded	CODMLB001	0.05±0.1[a]	8.5±14.7[b]	1.3±2.3[a]	3.3±5.7[c]	1.0±1.73[a]	14.00±24.8[a]	17.0±6.35[a]
	RCB262	0.0±0.0[a]	0.0±0.0[a]	0.0±0[a]	0.0±0.0[a]	0.0±0.0[a]	0.00±0[a]	17.0±2.00[a]
	HM21-7	0.0±0.0[a]	0.0±0.0[a]	0.0±0[a]	0.0±0.0[a]	0.0±0.0[a]	0.00±0[a]	19.0±2.31[a]
	CODMLB007	0.1±0.0[a]	36.0±4.3[ab]	6.0±0.6[ab]	11.0±0.00[b]	5.0±1.52[b]	54.70±33[a]	45.0±1.15[a]
Interactions (A)+(B)	$\alpha \leq 0.05$	0.406	0.00	0.002	0.001	0.028	0.06	0.144

Mean±Standard deviation, the different letters next averages indicate a significant difference after the Tukey HSD test (p<0.05)

(23.9 cm) against the lowest (19.1 cm) observed in unweeded plots. The same trend was observed for the flowering rate. In contrast to the number of pods, number of seeds per pod, weight of 100 seeds, length of pods, weight by plot and yield have been influenced by the manual weeding. The mean comparisons showed a difference between weed management methods for which the highest values were recorded in the plots manually weeded, unlike the lowest values were recorded in the unweeded plots. This reflects the high degree of harmfulness of weeds condition of free development.

Combined effects of weed management methods and varieties on the observed parameters: The results illustrated by the Table 3 on the combination of factors prove the unexistence of interactions management methods and varieties on some studied parameters (p>0.05) including: the seed yield, the rate of flowering and plant height at flowering. To this end, the unweeded treatment has shown some weak needing to factor combination varieties was noted. However, a positive interaction (p<0.05) was observed for the following parameters:

- The weight of 100 seeds for which the best combination is that of the variety COODMLB007 seeded on manually weeded plots
- The highest number of seeds per pod result from RCB262x manual weeding CODMLB001x manual weeding
- The size of the pods has shown the same value observed to two management methods. From this fact, the best combination for weeded plots was obtained varieties: CODMLB007 and RCB262. RCB262 and HM21-7 for chemically treated plots
- The high number of pods per plant was obtained by combining weeding×RCB262 variety

Biodiversity determination at 30 and 60 days after seeding: According to Nkoa *et al*. (2015), the degree of infestation estimate of crops by weeds can be achieved by the relative frequency denoted by (Fr) which reviews the heterogeneity of flora in a statement in determining the number of times that a species is present in a statement and species richness (S). Species are encoded according to Salonen *et al*. (2005) (CYPRO) *Cyperus rotundus*, (AGECO) *Ageratum conyzoides*, (AGEHU) *Ageratum houstonianum*, (SETPU) *Setaria pumila*, (COMBE) *Commelina benghalensis*, (COMDI) *Commelina diffusa*, (NICPH) *Nicandra physaloides*, (OXAAC) *Oxalis acetosella*, (GALPA) *Galisonga parviflora* (AMASP) *Amaranthus spinosus,* (BIDPI) *Bidens pilosa*, (CYNDA) *Cynodon dactylon*, (SPIOL) *Spilanthes oleracea*, (MARVU) *Marrubium vulgare* and (GRAHO) *Grassocephalon houstonianu*.

Table below provide information on the relative frequencies and species richness of different weed species inventoried at 30 days intervals and this in different plots on different methods of weed management related to the specific variety.

Thus, the Table 4 on manual weeding states that species richness increased from 13 species (30 DAS) with disappearance (SETPU, COMDI and GALPA) to 11 species (60 DAS) with addition of two species (MARVU and AGEHO), it should be noted that only CYPRO proved common to all plots.

However, chemically treated plots (30 DAS) had low species richness or for species including CYPRO and OXAAC had a max frequency (12) the trend turned to characterizing high biodiversity inventory of 60 DAS whose richness is 8 species: AGECO, NICPH, SETPU, CYNDA, AGEHO, BIDPI, MARVU and GRAHO that were added to the list of previous inventory with COMDI disappearance. What is interesting for this management method is the presence of the max frequency with CYPRO 12 in two inventories (Table 5).

Concerning unweeded plots, results on Table 6 shows that the floristic list was a slight variation in species richness perspective increased from 11-30 and 13-60 DAS with disappearance COMDI and appearance of AGEHO, MARVU and GRAHO. The max frequency in both inventories marked CYPRO.

DISCUSSION

The results obtained in this study showed the share of each factor on the one hand the production of culture and in the other hand the behavior of weed flora.

Indeed, it was found that the varieties have distinguished height viewpoint and weight of 100 seeds. Further positive interactions have emerged clearly varietal responses to environmental conditions and agronomic practices. This argument was supported by Atuahene-Amankwa *et al.* (2004) who have raised their share of the action of the bean crop systems and genotype on the performance of certain parameters including: Yield, number of pods per plant and seeds per pod.

Management methods have influenced all studied parameters, however low values observed in unweeded plots reflect the strong pressure due to weeds. Thus, the results of the study conducted by Felton (1976) go in the same direction as in this study, because it showed the negative effect of the high abundance of weeds in soybean crop that affects nodulation with consequent in low fixation of atmospheric nitrogen.

Moreover, manual weeding occurred after the weeds are installed as well as juveniles being exercised some competition on growth which would explain the low height of the plants. To this could be added the stress of tillage tool. Approached in the same direction, Bertrand and Dore (2008) have demonstrated the positive impact of cultivation on the physical, chemical and biological soil properties, but the flip side was mentioned by Rasmussen (1992) which highlights its negative

Table 4: Frequencies and species richness of weeds inventoried 30 DAS within manually weeded plots

30 DAS	Species	R1V1S	R2V1S	R3V1S	R1V2S	R2V2S	R3V2S	R1V3S	R2V3S	R3V3S	R1V4S	R2V4S	R3V4S	Frequency
1	*Spilanthes oleracea* (SPIOL)	1	1	0	0	0	0	0	0	0	0	0	1	3
2	*Cyperus rotundus* (CYPRO)	1	1	1	1	1	1	1	1	1	1	1	1	12
3	*Galisonga parviflora* (GALPA)	0	1	0	1	0	0	1	0	1	0	0	0	4
4	*Ageratum conyzoides* (AGECO)	0	0	1	0	1	0	0	0	0	0	0	0	2
5	*Commelina benghalensis* (COMBE)	0	0	1	0	1	0	0	1	0	0	0	1	4
6	*Oxalis acetosella* (OXAAC)	1	1	1	1	1	1	1	1	1	1	1	0	11
8	*Nicandra physaloides* (NICPH)	0	0	1	1	1	1	1	1	1	1	1	1	10
9	*Amaranthus spinosus* (AMASP)	0	0	0	0	0	0	0	0	0	1	1	0	2
10	*Setaria pumila* (SETPU)	0	1	0	1	0	0	0	0	0	0	0	1	3
11	*Bidens pilosa* (BIDPI)	0	0	0	0	0	1	0	0	0	0	0	0	1
12	*Cynodon dactylon* (CYNDA)	0	0	0	0	0	1	1	0	0	0	0	0	2
13	*Commelina diffusa* (COMDI)	0	0	0	0	0	1	0	0	0	0	0	1	2
No. of species		3	5	5	5	5	6	5	4	4	4	4	6	13
60 DAS	**Species**	**R1V1S**	**R2V1S**	**R3V1S**	**R1V2S**	**R2V2S**	**R3V2S**	**R1V3S**	**R2V3S**	**R3V3S**	**R1V4S**	**R2V4S**	**R3V4S**	**Frequency**
1	*Spilanthes oleracea* (SPIOL)	0	0	0	1	1	1	1	1	0	1	0	0	6
2	*Cyperus rotundus* (CYPRO)	1	1	1	1	1	1	1	1	1	1	1	1	12
3	*Ageratum conyzoides* (AGECO)	0	0	1	0	0	0	0	0	1	0	0	1	2
4	*Commelina benghalensis* (COMBE)	1	0	0	0	0	0	0	0	0	1	0	0	2
5	*Oxalis acetosella* (OXAAC)	0	1	1	1	1	0	0	1	1	1	1	1	9
6	*Nicandra physaloides* (NICPH)	0	0	0	0	0	1	0	0	0	0	0	1	2
7	*Amaranthus spinosus* (AMASP)	1	0	0	0	1	0	1	0	0	0	0	0	3
8	*Cynodon dactylon* (CYNDA)	0	0	0	0	0	1	0	0	0	1	0	0	2
9	*Ageratum houstonianum* (AGEHO)	1	1	1	1	1	0	1	0	0	1	0	0	7
10	*Bidens pilosa* (BIDPI)	0	0	0	0	0	1	0	0	0	0	0	0	1
11	*Marrubium vulgare* (MARVU)	0	0	0	1	1	0	0	0	0	0	0	0	2
No. of species		4	3	4	5	6	5	4	3	3	6	2	4	11

Table 5: Frequencies and species richness of weeds inventoried 30 DAS within the chemically treated plots

30 DAS	Species	R1V1H	R2V1H	R3V1H	R1V2H	R2V2H	R3V2H	R1V3H	R2V3H	R3V3H	R1V4H	R2V4H	R3V4H	Frequency
1	*Cyperus rotundus* (CYPRO)	1	1	1	1	1	1	1	1	1	1	1	1	12
2	*Commelina benghalensis* (COMBE)	0	0	1	0	0	0	1	0	0	1	1	0	4
3	*Oxalis acetosella* (OXAAC)	1	1	1	1	1	1	1	1	1	1	1	1	12
4	*Commelina diffusa* (COMDI)	0	0	0	0	0	1	0	0	0	0	0	0	1
No. of species		2	2	3	2	2	3	3	2	2	3	3	2	4
60 DAS	Species	R1V1H	R2V1H	R3V1H	R1V2H	R2V2H	R3V2H	R1V3H	R2V3H	R3V3H	R1V4H	R2V4H	R3V4H	Frequency
1	*Cyperus rotundus* (CYPRO)	1	1	1	1	1	1	1	1	1	1	1	1	12
2	*Ageratum conyzoides* (AGECO)	0	0	0	1	1	0	1	0	1	1	0	0	5
3	*Commelina benghalensis* (COMBE)	0	0	1	0	0	1	1	1	1	1	0	1	7
4	*Oxalis acetosella* (OXAAC)	1	0	1	0	0	0	1	1	1	1	1	1	8
5	*Nicandra physaloides* (NICPH)	0	0	0	0	0	1	0	1	0	0	0	0	2
6	*Setaria pumila* (SETPU)	0	0	1	1	1	0	0	0	0	0	0	0	3
7	*Cynodon dactylon* (CYNDA)	1	1	0	1	1	0	0	0	0	0	0	1	5
8	*Ageratum houstonianum* (AGEHO)	1	0	0	0	0	0	0	0	0	0	0	0	1
9	*Bidens pilosa* (BIDPI)	0	0	0	0	0	1	0	0	0	0	0	0	1
10	*Marrubium vulgare* (MARVU)	0	0	0	1	1	0	0	0	0	0	0	1	3
11	*Grassocephalon houstonianu* (GRAHO)	0	0	0	0	0	1	0	0	0	0	0	0	1
No. of species		4	2	4	5	5	4	4	4	4	4	2	5	11

Table 6: Frequencies and species richness of weeds and inventoried 30 and 60 DAS within unweeded plots

30 DAS	Species	R1V1T	R2V1T	R3V1T	R1V2T	R2V2T	R3V2T	R1V3T	R2V3T	R3V3T	R1V4T	R2V4T	R3V4T	Frequency
1	*Spilanthes oleracea* (SPIOL)	0	1	0	0	0	0	1	0	1	0	0	0	3
2	*Cyperus rotundus* (CYPRO)	1	1	1	1	1	1	1	1	1	1	1	1	12
3	*Galisonga parviflora* (GALPA)	0	0	0	0	0	0	0	0	1	0	0	1	2
4	*Ageratum conyzoides* (AGECO)	0	1	1	1	0	0	1	0	0	0	0	0	4
5	*Oxalis acetosella* (OXAAC)	1	1	0	1	1	1	0	0	0	1	1	1	8
6	*Nicandra physaloides* (NICPH)	1	0	1	0	1	1	1	1	1	1	1	0	9
7	*Setaria pumila* (SETPU)	0	0	0	1	0	0	0	0	0	0	0	1	2
8	*Bidens pilosa* (BIDPI)	1	0	1	0	0	1	0	0	0	0	0	0	3
9	*Amaranthus spinosus* (AMASP)	1	0	0	0	0	1	1	1	1	1	1	1	8
10	*Cynodon dactylon* (CYNDA)	0	0	0	1	1	0	0	0	0	1	1	0	4
11	*Commelina diffusa* (COMDI)	0	0	1	0	0	0	0	0	0	0	0	0	1
No. of species		5	4	5	5	4	5	5	3	5	5	5	5	11
60 DAS	Species	R1V1T	R2V1T	R3V1T	R1V2T	R2V2T	R3V2T	R1V3T	R2V3T	R3V3T	R1V4T	R2V4T	R3V4T	Frequency
1	*Spilanthes oleracea* (SPIOL)	0	1	1	0	0	1	1	1	1	1	0	1	8
2	*Cyperus rotundus* (CYPRO)	1	1	1	1	1	1	1	1	1	1	1	1	12
3	*Ageratum conyzoides* (AGECO)	0	1	1	1	1	0	1	0	1	1	1	1	9
4	*Commelina benghalensis* (COMBE)	0	0	0	0	0	0	0	0	0	0	1	0	1
5	*Oxalis acetosella* (OXAAC)	1	0	1	0	0	0	0	0	0	1	0	0	3
6	*Nicandra physaloides* (NICPH)	0	0	1	0	0	1	1	1	1	1	1	1	8
7	*Amaranthus spinosus* (AMASP)	0	0	0	0	0	0	0	0	0	1	0	0	1
8	*Setaria pumila* (SETPU)	0	1	0	0	0	0	0	0	1	0	0	0	2
9	*Cynodon dactylon* (CYNDA)	1	0	0	1	1	0	1	0	0	1	0	0	5
10	*Ageratum houstonianum* (AGEHO)	0	0	0	1	1	0	1	0	0	1	0	0	4
11	*Bidens pilosa* (BIDPI)	1	0	1	0	0	1	0	0	0	1	0	0	4
12	*Marrubium vulgare* (MARVU)	0	0	0	0	0	0	0	0	0	1	0	0	1
13	*Grassocephalon houstonianu* (GRAHO)	0	1	0	0	0	0	0	0	0	0	0	0	1
No. of species		4	5	6	4	4	4	6	3	5	10	4	4	13

effect on some cereals with loss of grain yield of triticale who is intolerant. The feat achieved by manual weeding as in our case was discussed simultaneously by Amare and Mohammed (2014) who argue that pretreatment emergent of S-metolachlor 2 kg ha^{-1} slightly increased grain yield of beans, unlike to manual weeding.

Outside the weed infestation, climate by the uneven distribution of rainfall during the crop management was less conducive to the formation and pod filling. This correspond the viewpoint that emitted by Mick *et al*. (2015) on water stress in common bean crop that occurs during flowering will affect the number of pods per plant, the length and the filling rate. Eventually resulting in a significant decrease in seed weight.

Floristic inventories have identified the effects generated by the management methods on flora whose presence was previously favored by monoculture. Thought confirmed by Murphy and Lemerle (2006) the presence of weeds in a cultivated plot and depends on the action of agronomic practices and environmental factors. Supplemented by Koocheki (2009) showed that the inversion of the weed flora gold rotation beet and winter wheat. As for active matter, we note that the latter did not meet our expectations since a sharp increase was observed 30 DAS resulting in increasing species richness. Some authors have attempted to explain this phenomenon by highlighting the soil defined by the binding capacity of the active matter to soil colloids, according to Conklin and Lym (2013) on a soil low in organic matter there is a low adsorption to soil colloids produced and this also adds volatilization losses. By cons, manual weeding are suitable for stimulation of dormancy of some seeds, our arguments have thus found an explanation of the results of the study conducted by Munier-Jolain (2008) which showed that weeding is likely to rise to the surface the seeds buried in the soil from 5-10 cm and place in favorable conditions after germination dormancy.

Cyperus rotundus has proved to be indifferent species for this study, since its resistance has been noticed by the max frequency regardless of the method of management that would in part by its biology. Thus, according to Ratiarson and Fallisse (2007) passing the tillage tool can lead either to the removal of leaves and tubers fragmentation leading to the awakening of dormant buds and forming new rhizomes especially in heat and strong sunshine conditions and completed by Kouassi (2006) that highlight its strong ground occupation aptitude or 2150 plant against 150 plants m^{-2} for other weeds in sugar cane culture and this within 4 months after planting. Farther rice cultivation *C. esculentus* from the same family as sedges *C. rotundus* had proved devastating against the weed species *Oryza* sp. associated with this culture and on lands or wetlands.

CONCLUSION

The best technical itinerary for successful weed control program in common bean culture still remains a major concern in Upper-Katanga. From the results obtained for this study which showed varietal differences and weed management methods on growth parameters and development of culture and this is illustrated by the high performance achieved by manual weeding for two in a thirty day time period and especially to the young stage for weeds, followed by the chemical practice and finally unweeding for which major differences are observed over previous management methods.

However, to both inventories some species could either disappear or reappear this largely testify the importance of the soil seed bank, as it has been noticed that some species matched those of the inventory before opening, but *Cyperus rotundus* species was more dangerous and requires future envisages a mix of control methods to eradicate so slightly. However, the wording has been able to manage weeds and that for a small period because it was noticed a small invasion of the plots by weeds thirty days after sowing.

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