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Nota Científica

Management of *Adenocalymna impressum* on pasture in the northwestern Mato Grosso

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Abstract: The occurrence of weeds in pastures is a factor that represents a loss of productivity because they compete directly with the essential elements and space with the forage. We aimed with this study was to evaluate the chemical control of *Adenocalymna impressum* with experiments conducted in the municipality of Juruena, Mato Grosso. Control techniques evaluated were: fluroxypyr + aminopyralid in adult plant; (fluroxypyr + aminopyralid) + (triclopyr) in adult plant; fluroxypyr + aminopyralid on regrowth; (fluroxypyr + aminopyralid) + (triclopyr)on regrowth; (picloram + triclopyr) basal; (picloram + triclopyr) on stump (after mowing). The experiment was conducted in a randomized block design with four replications. We give phytotoxicity notes from 0 to 100, where 100 means death of the plant, we also evaluated phytotoxicity of foliar herbicides on *Brachiaria brizantha* cv. 'Marandu'. The evaluations were performed at 10, 20, 30, 60, 90, 120 and 150 days after application. The data were submitted to analysis of variance and means were compared by Tukey`s test at 5% probability, using the SISVAR program. All treatments showed weed control, but only the herbicide picloram + triclopyreffectively controlled A. Impressum. Damage of foliar herbicides on B. brizantha was temporary, it recovered on 3rd assessment.

Key-words: weed; *Adenocalymna impressum*; cipó-joaquinzão, pasture, herbicide.

Manejo de *Adenocalymna impressum* em pastagem na região noroeste de Mato Grosso

Resumo: A ocorrência de plantas daninhas em pastagem é um fator que representa perda de produtividade, pois competem diretamente pelos elementos essenciais e espaço com a forrageira. Objetivou-se, com este trabalho, avaliar o controle químico de *Adenocalymna impressum*, com experimentos realizados no município de Juruena, Mato Grosso. As técnicas de controle avaliadas foram: fluroxypyr + aminopyralid em planta adulta; (fluroxypyr + aminopyralid) + (triclopyr) em planta adulta; fluroxypyr + aminopyralid na rebrota; (fluroxypyr + aminopyralid) + (triclopyr) na rebrota; (picloram + triclopyr) basal; (picloram + triclopyr)no toco (pós-roçada). O experimento foi organizado em blocos casualizados, com 4 repetições. Foram dadas notas de fitotointoxicação de 0 a 100, sendo 100 para a morte da planta, também foi avaliado a fitotoxidade dos herbicidas foliares sobre a *Brachiaria brizantha* cv. Marandú. As avaliações foram realizadas aos 10, 20, 30, 60, 90, 120 e 150 dias após aplicação. Os dados foram submetidos a analise de variância e as médias comparadas pelo teste de Tukey a 5% de probabilidade, utilizando o programa SISVAR. Todos os tratamentos apresentaram controle da planta daninha, porém apenas o herbicida picloram + triclopyr controlou efetivamente a A. impressum. Os danos dos herbicidas foliares sobre a B. brizantha foi temporário, a mesma recuperou-se a partir da 3ª avaliação.

Palavras-chave: planta daninha; *Adenocalymna impressum*; cipó-joaquinzão, pastagem, herbicida.

1. INTRODUCTION

The brazilian cattle raising, mainly in State of Mato Grosso, is characterized by extensive system, with availability of pasture in extensive areas, enabling the production of beef and milk competitively in terms of cost of production and quality. The cattle raising in Brazil is the economic activity that occupies most land extension (SCHLESINGER, 2009). According the farming and cattle raising census of 2006, the areas of cultivated and natural pastures occupy in the country about 172 million hectares, while those for agriculture totaling less than 77 million hectares (IBGE, 2007).

Being developed primarily grazing, degradation of pastures is one of the biggest problems of the Brazilian livestock, directly affecting the sustainability of the production system. Although there are no studies that quantify exactly the magnitude of the problem as the size of the area, estimates have suggested that about 60% of the areas of cultivated pastures in the humid tropics of Brazil are degraded or some degradation stage (DIAS-FILHO, 2005; INOUE et al., 2012).

The occurrence of weeds in pastures planted in the Amazon region is a serious problem faced by cattle breeder, consequentente one of the highest cost components of production of the farms (FERREIRA & ZANINE, 2007). Some species stand out for the damages and competitiveness imposed on system, and can it vary your dominance conform the region and conditions of management imposed (POTT et al., 2006).

In pasture areas, the use of herbicides has been a sorely used option, due the control effectiveness, the high operating performance of sprayings, selectivity and higher residual in relation to the mechanical control (CARVALHO et al., 2004).

In the northwest of Mato Grosso, specifically in the municipality of Juruena, this situation occurs relatively frequently, because a significant portion of the pasture has been compromised by the weed infestation. Among the species that infest the pastures of this region, the "cipó-Joaquinzão" (*Adenocalymna impressum*) can be cited as one of the most worrisome due to management inefficiency and difficulties encountered by cattle breeder in the chemical control of this plant (HORN, 2011).

This study aimed to evaluate the chemical management of *Adenocalymma impressum* with different herbicides in pasture.

2. MATERIAL AND METHODS

The experiment was conducted at Fazenda Estrela, located in the municipality of Juruena, MT, to 10º19'56" south latitude and 58º27'55 " west longitude at an altitude of 236 m. The climate of the region, according to Köppen classification, is Aw, that is, high temperatures with rain in summer and dry in winter.

The place chosen for the tests is cultivated with *Brachiaria brizantha* Marandú infested with "cipó-Joaquinzão" (*Adenocalymna impressum*) has gently undulating and historical topography of degradation because after pasture establishment 15 years ago, was not carried out any practice of nutrient replenishment or soil correction.

We use a randomized block design with 7 treatments and 4 repetitions. Each plot consisted by 10 plants with circumference at the stem base between 5 and 8 cm and length greater than 2 meters, all the plants featuring intense vegetative state, with uniform size among all.

Different control methods were evaluated: application of two different leaf herbicides in two conditions (adult plant and regrowth); herbicide application at the stem base with or without previous mowing. Constituting the following treatments:

1- Application of fluroxypyr + aminopyralid on adult plants: foliar application was performed using the commercial herbicide Dominum® (equivalent acid of fluroxypyr 7.78% v v^{-1} and aminopyralid 3.89% v v^{-1}) in the dosage 2 L ha^{-1} of product, pulverized in adult plant.

2- Application of fluroxypyr + aminopyralid mixed with triclopyr Garlon® (equivalent acid of triclopyr 44.40% v v^{-1}) in adult plant: application of commercial foliar herbicides, in dosage 2 L ha^{-1} at a dosage of 0.5 L ha^{-1} of commercial product sprayed on adult plant.

3- Herbicide application fluroxypyr + aminopyralid on regrowth: application foliar at a dose of 2 L ha^{-1} of product, pulverized in regrowth, 35 days after mowing.

4- Herbicide application fluroxypyr + aminopyralid mixed with triclopyr in regrowth:) in dosage 2 L ha^{-1} with Garlon® (equivalent triclopyr acid 44.40% v v^{-1}) at a dosage of 0.5 L ha^{-1} of commercial product, being sprayed in regrowth, 35 days after mowing.

5- Basal application of picloram + triclopyr (Togar® TB (equivalent picloram acid 3.31% v v^{-1}) and triclopyr 6.62% v v^{-1}): wetting of lower third in all the perimeter of stem of the adult plant, using the commercial herbicide at dosage 8% of solution diluted in diesel oil as recommended.

6- Application of of picloram + triclopyr "stem" after-mowing: complete wetting of the remaining stem, after the mowing of the adult plant, at dosage 8% of solution diluted in diesel oil.

7- Control: was also kept a treatment for comparison, without the use of any control method.

The foliar herbicide applications were performed in a directed manner, in optimal environmental conditions (no wind, high relative air humidity and mild temperatures) using knapsack sprayer, carrying a spray bar with four jet tips flat fan XR 110.01, working with constant pressure of 2.1 kgf cm^2 (210 kPa) maintained by CO_2. During foliar application, it was kept a distance of 50 cm between the spray bar and the target. The volume of syrup applied was equivalent 200 L ha^{-1}. In the syrup was added 1% of the commercial product Joint Oil® (composed of mineral oil 76.1% v v^{-1}). The application in regrowth was held 35 days after the other treatments.

In the applications of treatments 5 and 6, we use PET bottle with a hole in the cover, applying on the plant stem until reach the pour point.

For treatments 3, 4 and 5, the performance of prior mowing was required, performed manually (sickle), realizing cutting of the stem in bevel, separating the aerial part of the plants roots, at a height between 10 and 15 cm of soil surface.

For comparison, we conducted one separate treatment, in which the plants were just mowed for elimination of shoot and stimulation of regrowth without the interference of any herbicide.

The area was fenced, aiming to prevent the cattle traffic on site during the experiment. Each treatment was identified with platelets of different colors, fixed in the basis of all the plants evaluated. The evaluations were performed at 10, 20, 30, 60, 90, 120 and 150 days after application (DAA), randomly choosing four plants per plot. The effectiveness of control methods has been measured by the notes generated by visual observation in comparison with the control. We give notes from 0 (zero) to 100 (one hundred) for plants, individually, as follows: zero means no control and 100 the death of the plant (total control). In the case of mowing, we evaluated the amount of shoots and length thereof, not being compared to the other treatments. We also evaluated the phytotoxicity for foliar herbicides in *Brachiaria brizantha* cv. 'Marandú' in comparison to the control.

The data obtained from all treatments except for the mowing, were subjected to F test of variance analysis. The effects of control methods, when significant, were compared by Tukey test at 5% probability, using for this the SISVAR statistical software (FERREIRA, 2011).

3. RESULTS AND DISCUSSION

We observe meaningfulness in the chemical control of *A. impressum* starting in the first evaluation, carried out 10 days after application (DAA) treatments (Table 1).

Over the posterior evaluations, we observed sharply that the treatments 5 and 6 (both with the use of picloram + triclopyr) promoted effective weed control, and treatment 6 (application of picloram + triclopyr in stump after mowing), already from 10 days, caused the death of plants, and its efficiency backed by the speed in control. The treatment 5 (application of picloram + triclopyr in stem) caused control close to 100% at 30 DAA, causing complete defoliation and desiccation of the stem (Figure 1).

The results obtained from the use of picloram + triclopyr are similar to those reported by Nunes (2001), who observed control with efficiency of 95.6% on *Memora peregrina*. Similar results too related by Vendrame et al. (2014), controlling *Vismia guianensis*.

The worst treatments, that do not caused control in weed plants besides the control, were the treatments 1, 2 and 3. We observed as a symptom, only the death of apical meristem and discoloration of the leaves that after 30 DAA back to normal. These treatments were constituted of the diluting the herbicide fluroxypyr + aminopyralid, alone or mixed with triclopyr, applied in adult plant or regrowth. These results demonstrate the inefficiency of these products for the control of *A. impressum*. Possibly, this low percentage of control is due to the structure of this plant belonging to family Bignoniaceae, whose morphological characteristics described by Lohmann (2006) include woody stem, coriaceous leaves with waxy thick cuticle, which hinders the penetration of herbicides into the vegetable.

The treatment 4 (fluroxypyr + aminopyralid mixed with triclopyr under the regrowth), presented at the 4th assessment, grades above 60%, indicating possible control the plant. However, after this evaluation, there was recovery of the treated plants. At the last evaluation, the scores were below 40%.

Table 1. Herbicides control notes on *Adenocalymna impressum* on 10, 20, 30, 60, 90, 120 and 150 days after application (DAA).

Treat*	Control Notes (DAA)						
	10	20	30	60	90	120	150
1	13,4 d	16,1 e	11,0 e	5,2 e	1,1 e	0,5 e	0,0 e
2	18,7 c	27,2 d	34,6 d	15,2 d	11,7 d	6,9 d	3,1 d
3	20,1 c	27,7 d	45,4 c	23,6 c	20,2 c	13,5 c	7,6 c
4	21,6 c	40,3 c	52,9 b	60,1 b	51,2 b	45,9 b	39,8 b
5	38,1 b	87,7 b	98,9 a	100,0 a	100,0 a	100,0 a	100,0 a
6	100,0 a	100,0 a	100,0 a	100,0 a	100,0 a	100,0 a	100,0 a
7	0,0 e	0,0 f	0,0 f	0,0 f	0,0 e	0,0 e	0,0 e
c.v. (%)	5,23	3,61	2,82	2,23	3,06	3,59	1,71

Means followed by same letters in the columns do not differ statistically by Tukey's test at 5% probability.

* Treatments: 1- fluroxypyr + aminopyralid (Dominum®) in adult plant; 2- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in adult plant; 3- fluroxypyr + aminopyralid (Dominum®) in regrowth; 4- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in regrowth; 5- picloram + triclopyr (Togar® TB) basal (1/3 of stem); 6- picloram + triclopyr (Togar® TB) on stump (after mowing); 7- Control.

In the comparison between treatments 1, 2, 3, 4, achieved with the application of foliar herbicide (fluroxypyr + aminopyralid alone or in admixture with triclopyr), it is necessary to emphasize that occurred greater control in plants in phase regrowth than in plant adult. This is proven by statistical superiority of banknotes of treatments 3 and 4 compared 1 and 2, since the herbicides are equivalent for both cases, differing only in development phase of the plant that was submitted to the application.

Carvalho (2001) affirms the greater efficiency of herbicides applied in regrowth than in previous adult plant, but must be applied when the regrowth represent leaf area able to absorb the product applied, otherwise the result may not be satisfactory.

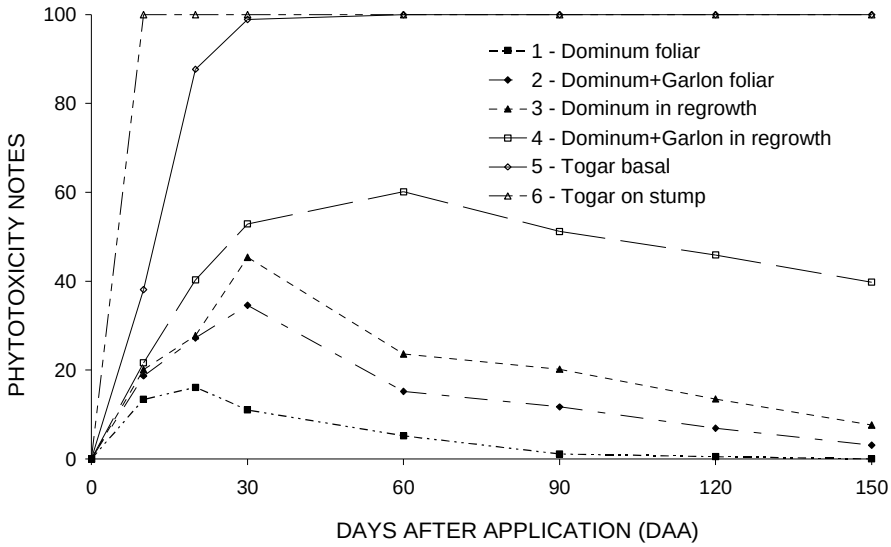

Figure 1. Phytotoxicity levels at 10, 15, 30, 60, 90, 120 and 150 DAA in *Adenocalymna impressum*.

* Treatments: 1- fluroxypyr + aminopyralid (Dominum®) in adult plant; 2- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in adult plant; 3- fluroxypyr + aminopyralid (Dominum®) in regrowth; 4- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in regrowth; 5- picloram + triclopyr (Togar® TB) basal (1/3 of stem); 6- picloram + triclopyr (Togar® TB) on stump (after mowing).

The phytointoxication caused in *Brachiaria brizantha* Marandú was significant due to contact with foliar herbicides applied in *A. impressum* (Table 2).

The damages caused in forage are observed with greater intensity in treatment 2 (fluroxypyr + aminopyralid mixed with triclopyr in adult plant) where we found chlorotic streaks in old leaves. The symptoms disappeared just after the 5th evaluation, where it showed full recovery of phytotoxicity occurred (Figure 2).

Caceres et al. (2004) studied the effect of selectivity of triclopyr + fluroxypir (triclopyr is the active ingredient of the herbicide Garlon®) on *Brachiaria brizantha* and concluded that this does not cause damage to the forage crop.

The treatments 1 and 4 (fluroxypyr + aminopyralid in adult plant and mixing with triclopyr in the regrowth) had low grades of phytointoxication in *B. brizantha* up to 30 DAA. From there, the interference of hebicides was practically null. For treatment 3 (fluroxypyr + aminopyralid in regrowth), only at 20 DAA is noticed some phytointoxication (note 6).

Table 2. Phytotoxicity of herbicides on *Brachiaria brizantha* cv. 'Marandú' at 10, 20, 30, 60, 90, 120 and 150 days after application (DAA).

TREAT*	PHYTOTOXICITY (DAA)						
	10	20	30	60	90	120	150
1	21,2 b	15,0 b	6,0 b	0,8 a	0,0 a	0,0 a	0,0 a
2	20,3 b	31,2 c	35,8 c	5,5 b	0,0 a	0,0 a	0,0 a
3	5,3 a	6,0 ab	0,0 a	0,0 a	0,0 a	0,0 a	0,0 a
4	19,8 b	12,5 bc	3,7 ab	0,0 a	0,0 a	0,0 a	0,0 a
5	0,0 a	0,0 a	0,0 a	0,0 a	0,0 a	0,0 a	0,0 a
c.v. (%)	**27,42**	**25,18**	**28,32**	**74,48**	**0,0**	**0,0**	**0,0**

Means followed by same letters in the columns do not differ statistically by Tukey's test at 5% probability.

* Treatments: 1- fluroxypyr + aminopyralid (Dominum®) in adult plant; 2- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in adult plant; 3- fluroxypyr + aminopyralid (Dominum®) in regrowth; 4- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in regrowth; 5- Control.

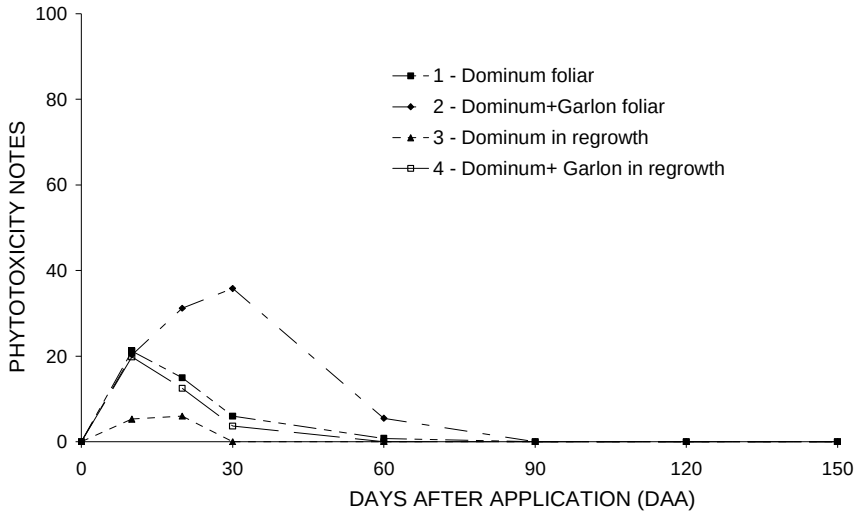

Figure 2. Phytotoxicity levels at 10, 15, 30, 60, 90, 120 and 150 DAA in *Brachiaria brizantha.*

* Treatments: 1- fluroxypyr + aminopyralid (Dominum®) in adult plant; 2- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in adult plant; 3- fluroxypyr + aminopyralid (Dominum®) in regrowth; 4- fluroxypyr + aminopyralid mixed with triclopyr (Dominum®+Garlon®) in regrowth.

4. CONCLUSIONS

On the experimental conditions in which it was carried out this work, we can concluded that:

A) Only treatments with picloram + triclopyr diluted in diesel oil were effective in controlling *Adenocalymna impressum*;

B) None of the treatments with foliar herbicide showed permanent phytointoxication in *Brachiaria brizantha* cv. Marandú which can compromise the forage productivity future.

REFERENCES

CACERES, N.T.; MODESTO, J.C.; ONO, E.O.; RODRIGUES, J.D. Controle de Mimosa pudica com a aplicação de triclopyr + fluroxypyr em pastagem de *Brachiaria brizantha*. In: CONGRESSO BRASILEIRO DA CIÊNCIA DAS PLANTAS DANINHAS, 24, São Pedro, SP. **Anais...** Londrina: SBCPD. 2004. 1 CD.

CARVALHO, F.T.; CACERES, N.T.; PELISSARO, D.S.; SOUTO, T.L. Eficiência de herbicida no controle pós-emergente de *Waltheria americana* e *Sida graziovii* em pastagem de *Brachiaria decumbens*. In: CONGRESSO BRASILEIRO DA CIÊNCIA DAS PLANTAS DANINHAS, 24, São Pedro, SP. **Anais...** Londrina: SBCPD. 2004.1 CD.

CARVALHO, L. H. Destruição de soqueira de algodão. In: CONGRESSO BRASILEIRO DO ALGODÃO, 3., 2001, Campo Grande. Produzir sempre, o grande desafio: **Resumos...** Campina Grande: Embrapa Algodão; Dourados: Embrapa Agropecuária Oeste, 2001. p. 95-99.

DIAS-FILHO, M.B. **Degradação de pastagens na região Norte**. Belém: Embrapa Amazônia Oriental, 2005. Disponível em: <http://www.diasfilho.com.br/Degradacao_de_pastagens_na-regiao_Norte.pdf>. Acesso em 22 set. 2011.

FERREIRA, D.F. Sisvar: a computer statistical analysis system. **Ciência e Agrotecnologia**, v. 35, n. 6, p. 1039-1042, 2011.

FERREIRA, D. J.; ZANINE, A. M. Importância da pastagem cultivada na produção da pecuária de corte brasileira. **Revista Eletrônica de Veterinaria**, v.8, n. 5, p.1-17, 2007.

HORN, R. **Manejo de *Adenocalymna impressum* em pastagem na região noroeste de Mato Grosso**. 2011. 35f. Monografia de conclusão de Curso (Agronomia) - Universidade do Estado de Mato Grosso, Alta Floresta, MT.

IBGE. 2007. **Resultados preliminares do Censo Agropecuário confirmam expansão da fronteira agrícola na região Norte**. Disponível em: <http://www.ibge.gov.br/home/presidencia/noticias/noticia_visualiza.php?id_noticia=1064&id_pagina=1>. Acesso em 14 set. 2011.

INOUE, M. H.; SILVA, B. E.; PEREIRA, K. M.; SANTANA, D. C.; CONCIANI, P. A.; SZTOLTZ, C. L. Levantamento fitossociológico em pastagens. **Planta Daninha**, v.30, n.1, p.55-63, 2012.

LOHMANN, L.G. Untangling the phylogeny of neotropical lianas (Bignonieae, Bignoniaceae). **American Journal of Botany**, v.93, n.2, p.304-318, 2006. http://dx.doi.org: 10.3732/ajb.93.2.304.

NUNES, S. G. **Controle de plantas invasoras em pastagens cultivadas nos Cerrados**. 2001. Disponível em: <http://www.cnpgc.embrapa.br/publicacoes/doc/doc_pdf/DOC117.pdf >. Acesso em: 09 out. 2011.

POTT, A.; POTT, V. J.; SOUZA, T. W. **Plantas daninhas de pastagem na região de Cerrados**. Campo Grande: Embrapa Gado de Corte, 2006. 336p.

SCHLESINGER, S. **O gado bovino no Brasil**. 2009. Disponível em: <http://www.boell-latinoamerica.org/downloads/Texto_Gado_Boll_2009-4.pdf>. Acesso em 14 set. 2011.

VENDRAME, G. H. M.; YAMASHITA, O. M.; CARVALHO, M. A. C.; CAMPOS, O. R.; DALLACORT, R.; KOGA, P. S.; PARENTE, T. L.; CAIONI, S.; PERES, W. M.; OLIVEIRA, R. B. Manejo químico de *Vismia guianensis* com diferentes misturas de herbicidas auxínicos em área de pastagem de *Brachiaria brizantha*. **Revista de Ciências Agroambientais**, v.12, n.1, p.35-41, 2014.