

Fall Armyworm: Ka jingtip bniah, ki dak ki shin jong ka jingpynjutor bad ki lad jingiada ba pher ba pher na une u khniang

(Ka Kot Lyngkdop)



**Originally published
in English by**

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G. T. Behere
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N. Prakash

**La pynkylla sha ka
ktien Khasi da I**

Naphibanri D. Lyngdoh
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2019

**ICAR Research Complex for NEH Region, Umiam
Meghalaya-793103**



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- *Ia ka hok long trai jong kane ka kot lyngkdop lah bat da u nongthoh. La khang pyrshah ban pynmih copy ne pynsaphriang ia kino kino ki bynta kiba na kane ka kot lyngkdop da kaba photostat ne kiwei pat ki rukom khlem ka jingpan jingbit da ka jingthoh na kane ka jaka pule.*
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Ka Jinglamphrang Lyngkot

U Khniang Fall Armyworm (FAW) u long u jait khniang uba don iaka bor ban wanrah iaka khlam ban pynjot pynjutor iaki jingthung jingtep kiba kongsan haka ban kyntiew ia ka ioh ka kot ha ki Ri ha kylleng satlak ka pyrthei. Une u jait khniang u mih tynrai na ka thain sepngi (America) bad u la nang iai pur sha ki Ri jong ka dewbah Africa kaba lah wanrah ia ka jingduh nong kaba khraw ha ka ioh ka kot. Ha ka Ri India, ia une u khniang la shem nyngkong ha u bnai Jymmang jong u snem 2018 ha ka jylla Karnataka bad hadien une u khniang u la nang saphriang sha ki 10 tylli kiwei pat ki jylla haduh pdeng u bnai Lber. Ha ka thain shatei lam mihngi jong ka Ri India, ia kane ka khlam lah shem ha ka sien ba nyngkong ha kaba kut jong u bnai Lber, 2019 ha Lunglei District jong ka jylla Mizoram bad ha West Tripura district jong ka jylla Tripura. Hadien katto katne por, la shem iaka jingpur kynsan kaba khraw jong kane ka khlam ha U bnai Iaiong haka jylla Mizoram bad Nagaland. Hadien, la shem ka jingpynjutor ia u jingthung Riewhadem (Maize crop) ha kaba sdang jong u bnai Jymmang ha ki jylla Meghalaya, Manipur, Sikkim bad Arunachal Pradesh kiba don haka bynta shatei lam mihngi jong ka Ri India. Ha kaba pyrkhat, ia kane ka jingpur stet bad ki jingpynjutor kiba lah wanrah lyngba une u khniang, ka long kaba kongsan ban shim jingiada na ka jingroi jong une u khniang ha ka por kaba dang sdang thung ia ki jingthung ha la ki jaka rep. Ha kaba puson ia kane ka jingeh, la pynkhreh kyrpang ban pynkhlain ia ka rukom sngewthuh ha ka ban tip ne lap ia une u jait khniang kyrpang na ka bynta ki nongrep, nongiarap, ki khynnah pule bad kiwei kiwei kiba don bynta ha kane ka liang.

La trei shitom ruh ha ka ban ai iaki jingtip shaphang ki lad iada bad ka nongrim rukom pyntreikam haka por kaba biang.

Editors

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Ka Jinglamphrang

- Ka kyrteng Saian (Scientific name) : *Spodoptera frugiperda*
Ka Kyrdan (Order) : Lepidoptera
Longiing (Family) : Noctuidae
- U mih tynrai na ka thain Sepngi (America). U la nang iai pur sha ki Ri jong ka dewbah Africa bad Asia bad u lah wanrah iaka jingduhnong kaba khraw ha ka ioh ka kot.
- Ka jingboi jong une u khniang Fall Armyworm la lap ha ki jingthung jingtep haduh palat 50 tylli ki Ri lyngba 2 tylli ki dewbah tang hapoh ka 2 snem.
- Ka jinglap ia une u khniang FAW la shem ha ka **Ri India ha u bnai Jymmang, 2018** bad ka jingwad bniah shaphang une u khniang (phylogenetic analysis) ka la pynpaw ba une u khniang uba boi ha u jingthung riewhadem ha India u iasnoh rynjup lang bad uto ha Ri **Florida (rice strain), Ghana, Nigeria, Uganda.**



Ki dak ki shin ban ithuh bniah ia une u khniang

Fall Armyworm (FAW)

4 tylli ki dak pyllon baheh ha ka jingpynbeit kaba sawdong haka bynta kaba shalor jong ka met.

Saw tylli ki dak pyllon kiba rit ha ka jingpynbeit kaba long sawdong (trapeze arrangement) ha kawei pat ka bynta kaba shalor jong ka met.

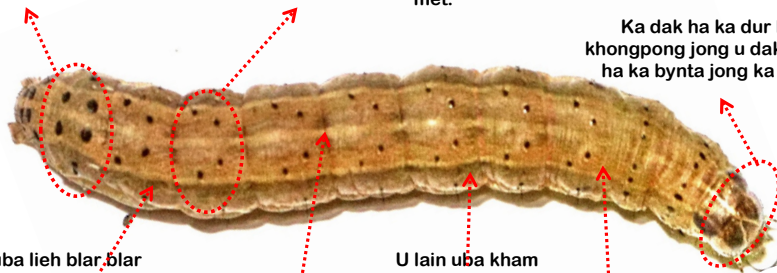
Ka dak ha ka dur kaba khongpong jong u dak thoh 'Y' ha ka bynta jong ka khlieh.

U lain uba lieh blar blar ha ka bynta kaba kham shalor jong ka krung.

U lain uba lieh blar blar ka bynta kaba shalor jong ka met.

U lain uba kham rben ha ka bynta jong ka krung.

Ka bynta shalor ka met kaba kham shai.



Ka jingpaw jong ki pylleng u khniang Fall Armyworm

Ka long kaba kham jynjar ban pyniapher ia ki kynton pylleng jong une u khniang na kiwei pat ki jait khniang kiba iasyriem kiba ngi lah ban shem ha u jingthung riewhadem. Une u khniang u ju kha pylleng ha ki kynton ha ki bynta kaba shapoh jong u sla ne jyntang. Ia ki pylleng lah ban kha ha kaba shi syrtap ne bun syrtap. Ka rong jong ki pylleng ka long rong makhon ha ryngkat bad ka jingsop ki niuh lung ne teng teng khlem ka jingsop niuh lung.



**Pylleng jong u fall
armyworm**
Spodoptera frugiperda



**Pylleng jong u Oriental leaf
worm**
Spodoptera litura



**Pylleng jong u Oriental
armyworm**
Mythimna separata

Ka rukom long ka dur ka dar jong une u ksain khun Fall armyworm

Kumno ba une u ksain khun Fall armyworm u iapher ka dur ka dar na kiwei pat ki jait khniang kiba ia bam ia u jingthung riewhadem?



Fall armyworm
Spodoptera frugiperda



Oriental leaf worm
Spodoptera litura



Oriental armyworm
Mythimna separata

Ka dur ban ithuh ia u thabalong Fall armyworm

Kumno ba u iapher na kiwei pat ki jait thabalong kiba bam ia u jingthung riewhadem?



Fall armyworm
(Shynrang)
Spodoptera frugiperda



Oriental leaf worm
Spodoptera litura



Oriental armyworm
Mythimna separata

Ki kyrdan jingim u khniang Fall Armyworm



Pylleng

(Hadien 4-6 sngi ki kylla long ksain)



U Ksain

(Hadien 14-17 sngi ki kylla long niang long)



U Niang long

(Hadien 7-8 sngi ki kylla thabalong)



**U Thabalong
shynrang**



**Ka Thabalong
kynthei**

(Ki thabalong ki im 7 -9 sngi)

Ki kynton pylleng u khniang Fall Armyworm

Ka thabalong kynthei ka lah ban kha palat ia ka 1000 tylli ki pylleng
ha ka shi rynjup ne bun rynjup ha u jingthung riewhadem ne ha
kiwei kiwei pat ki jait jingthung



Ka jingsan kaba nyngkong u ksain Fall Armyworm

Ki ksain khun rit ba dang shu mih na ki pylleng ki bam shi jaka ha ka shiliang jong u sla (ne shapoh u jyntang ba mih sla lung) bad suki suki ki pur sha uwei pat u jingthung lyngba ka rukom jingat lyer (ballooning mechanism)



Ki dak ki shin kiba paw nyngkong na ka jingpynjutor une u khniang

Ka jinglong stang ki sla kum ka kot sada
(Papery windows)



Ka jingsan kaba ar u ksain Fall Armyworm

**Ki ksain khun ki long kiba khlain bor ban bam bad ki lah ruh ban
pynpei thliew kiba rit ha ki sla/lane pynlong stang ia ki sla kum ka
kot sada**



Ka jingsan kaba lai, saw bad san u Ksain Fall Armyworm

Bunsien hi ki ksain heh ki sngewtynnad ban shong ban bam marwei ha khap u jyntang ba mih lung lane shapoh jong ka met u jingthung bad lah ban iohi ia shibun ki thliew kiba kham heh lem bad ka jakhlia (excreta) jong ki ksain heh



Photo credit: Bakordalin Chyne

Ka jingpher rong u ksain jong u khniang Fall Armyworm

Kine ki ksain ki pynmih ia ki rong bapher bapher bad ki sngewtynnad ban rieh tngen ha ki bynta ba shapoh ha ka por mynsngi. Lah ruh ban iohi ia kum ki eit khurat ha ki sla kiba long ka jakhlia ba la tyrkhong ba mih na ki ksain kiba lah ban iada ia ki na kiwei pat ki jait khniang ba pher ba pher ba don ha ka mariang kiba lah ruh ban pyniap ia kine ki ksain jong u Fall armyworm



Ka jingiabam para jait u khniang Fall Armyworm

**Ka don ka jingiabam kaba jur para maki. Bunsien u ksain uba kham
heh u ju bam ia uba dang kham rit bad kane ka pyniapher iaki na u
khniang True armyworm**



U Ksain ba la san bad u Niang long jong u khniang Fall Armyworm

**Bunsien ki ksain heh ki ju sngewtynnad ban rieh shapoh u jyntang
ba mih sla lung bad ynda ki lah san lah pura bha ki hap noh shapoh
ka khyndew ban long 'niang long**



**Ki lad jingiada ba pher ba pher ban
iada na ka jingpynjutor u khniang
Fall Armyworm ha u jingthung
Riewhadem**

Kumno ngin iakhun ia u?

**Donkam ia ka jingplan kaba sani bha ban iada
na ka jingmih jingroi bad jingpynjutor une u jait
khniang bad ha ka juh ka por ruh ban pyrkhat
bniah kumno ki lad ba ngi lah ban shim khnang ban
iada ia ka mariang**

Ki lad jingiada ba pher ba pher katkum ka jingbthah ka Sorkar Kmie ka Ri India (Govt. of India)

(Ref: OM: F. No. L3-L60/2019-SD.IV, dated 6th May 2019 and
OM: F. No 12080/37/2018- PPI, dated 28th May 2019)

La kyllum lang ia ki lad jingiada ba pher ba pher ha kine ki 6 bynta

- 1. Ki lad jingiada da kaba khmih bniah na ka por sha ka por ha ka jaka rep (Monitoring)**
- 2. Ki lad jingiada da kaba wad bniah ia ki khniang ha ka jaka rep khnang ban ioh jingtip ia ka jingshah pynjulor (Scouting)**
- 3. Ki lad jingiada ba ia trei ryngkat lang bad ka mariang (Cultural control)**
- 4. Ki lad jingiada da kaba pyndonkam da ki kti bad ki tiar (Mechanical control)**
- 5. Ki lad jingiada da kaba pyndonkam da ki dawai ba don phngit jingim bad ki khniang kiba long ki paralok jong u nongrep (Biological Control)**
- 6. Ki lad jingiada da kaba pyndonkam da ki bih khniang (Chemical Control)**

Ka Jingkhmih bniah (Monitoring)

Pynieng da ki shrip (pheromone traps) kumba 5 tylli ha ka shi akar ka jaka rep riewhadem bad ha ki jaka ba lah ban don ka jingsaphriang jong une u khniang ha ka aiom thung bad kumjuh ruh haka aiom bym dei thung ban tip ia ka jingdon une u jait khniang



Photo credit: Dr D M Firake

Ka Jingwad bniah ia u khniang ban ioh jingtip shaphang ka jingpynjolor (Scouting)

- Mar mar ba sdang mih u riewhadem ngi dei ban iaid ha ka jaka rep ha ka rukom u dak ‘W’.
- **Ha ka por ba dang rit u jingthung (kata kumba 3-4 taiew hadien ba lah mih) :** Donkam ban shim ia ki lad jingiada ba pher ba pher haba ngi iohi ba 5 % u jingthung u la shah pynjolor
- **Ha ka por ba u jingthung u lah kham san (kata kumba 5-7 taiew hadien ba lah mih) :** Donkam ban shim ia ki lad jingiada ba pher ba pher haba 10% u jyntang ba mih sla lung u la shah pynjolor noh hadien 5 taiew ba la mih bad kumjuh ruh haba ngi iohi ba 20% u jyntang ba mih sla lung u la shah pynjolor noh hadien 7 taiew ba la mih
- **Ha ka por ba la mih syntiew u riewhadem bad ynda lah bah khun–** Lada dang don ki dak pynjolor na une u khniang kum ha kane ka por ka bha eh ba ngin kiar na ka jingsynreit ia ki bih khniang. Hynrei, lada la don ka jingpynjolor kumba 10% ha u jingthung la donkam ban shim khia noh mar mar ia kane.



Ki lad jingiada ba ia trei ryngkat lang bad ka mariang (Cultural control)

- Puh jylliew ia ka jaka rep shuwa ban bet symbai. Kane ka lah ban pynmih shalor khyndew ia ki sop khniang ba rieh shapoh bad ia kine ki sop khniang lah ban wan bam da ki sim lane ki lah ruh ban iap ha ka bor jong ka sngi
- Thung ha ka por ba biang bad thung ryntih
- Thung bynrap ia u riewhadem bad ki kynja jingthung rymbai (nuksa u riewhadem bad u presbin)
- Pynieng da ki dieng ha ki jaka rep ban ioh shong ioh dem ki sim ba bun jait bun rukom. Pynieng kumba 10 tylli ki dieng ha ka jaka shi akar naduh ka por ba dang rit u jingthung haduh ba la heh shi bnai
- Narud na kiar jong ka jaka rep ia u riewhadem thung da ki kynja phlang ba jrong kumba 3-4 bun bad synreit ia kine ki phlang da ka dawai NSKE (5%) lane ka Azadirachtin 1500 ppm mar mar haba ngi iohi ia ki dak ki shin ka jingshah pynjulor une u phlang ha u khniang FAW

(Ba bteng)

- Ka rukom rep kaba khuid ha ka por kaba biang bad ka jingai ia ki dawai ki sboh ha ka rukom khein kaba biang
- Ka jingrep ia ki symbai hybrid kiba don ia ka jingsop kaba kah ka lah ban pynduna ia ka jingshah pynjulor na une u khniang FAW

Ki lad jingiada da kaba pyndonkam da ki kti bad ki tiar (Mechanical control)

- Ka jingjied da ki kti ia ki pylleng bad ki ksain khun bad ka jingpyniap ia ki da kaba kshih ne pynngam ha ka umphniang sharak



Ki lad jingiada da kaba pyndonkam da ki kti bad ki tiar (Mechanical control)

- Ka jingpyndonkam da u shyiap tyrkhong ban ber shapoh jong u sla (Whorl) jong u jingthung riewhadem hadien ba la iohi ia ka jingdon une u khniang FAW ha ka jaka rep



Ki lad jingiada da kaba pyndonkam da ki kti bad ki tiar (Mechanical control)

**Ka jingpyndonkam da ka khyndew ktieh shapoh
ki sla (whorls)**



Ki lad jingiada da kaba pyndonkam da ki kti bad ki tiar (Mechanical control)

Ka jingriam ia u thapbalong shynrang da kaba pynieng da ki shrip (pheromone traps) kumba 15 tylli ha ka shi akar ka jaka rep riewhadem



Ki lad jingiada da kaba rep ha ka rukom ban pynim, pynneh bad pynroi ia ki khniang kiba long ki paralok jong u nongrep (Bio-control strategies)

Ka jingrep bynrap ia ki kynja rymbai ryngkat bad u riewhadem ka long kawei na ki lad ba bun ban pynim, pynneh bad pynroi ia ki jait khniang ba pher ba pher kiba long ki paralok jong u nongrep (natural enemies)



Ki lad jingiada da kaba pyndonkam da ki khniang kiba long ki paralok jong u nongrep (Bio-control strategies)

Pyllait da ki khniang *Trichogramma pretiosum* lane *Telenomus remus* kumba 50,000 tylli ha ka jaka rep ba heh shi akar man ka taiew lane lada lap kumba 3 tylli ki thapbalong shynrang ba la ngat ha ka shrip ba la buh ngi lah ruh ban pyllait da kine ki juh ki khniang *Trichogramma pretiosum* lane *Telenomus remus*.



Ki lad jingiada da kaba pyndonkam da ki dawai ba don phngit jingim (Bio-control strategies)

- Ki dawai ba don jingim (Biopesticides):
- Lah ban pyndonkam da kine ki dawai ba don phngit jingim (kum u entomopathogenic fungi bad bacteria) lada ka jingpynjutor ia u jingthung ka long tang kumba 5% ha ka por ba u dang rit bad kumba 10% ynda u la kham san
- Ki dawai ba don phngit jingim kum u Entomopathogenic fungal formulations:
- Synreit da ka *Metarhizium anisopliae* (1×10^8 cfu/g) kumba shi shamoit (5 gram) ha ka shi litar ka um da kaba theh shapoh jong ki sla bad ki jyntang (whorl) kumba 15-25 sngi hadien ba la dep thung. Lah



(Ba bteng)

ruh ba synreit biang kumba shisien lane arsien ha man la ka 10 sngi lada ngi iohi ba ka dang bun ka jingshah pynjulor u jingthung.

LANE

- Synreit da ka *Nomuraea rileyi* (1×10^8 cfu/g) kumba 3 gram ha ka shi litar ka um da kaba theh shapoh jong ki sla bad ki jyntang (whorl) kumba 15-25 sngi hadien ba la dep thung. Lah ruh ba synreit biang kumba shisien lane arsien ha man la ka 10 sngi lada ngi iohi ba ka dang bun ka jingshah pynjulor u jingthung.

Ki lad jingiada da kaba pyndonkam da ki dawai ba don phngit jingim (Bio-control strategies)

- Pyndon kam da u *Bacillus thuringiensis* var *kurstaki* kumba shiteng shamoit ha ka shi litar ka um lane 400 gram na ka bynta ka jaka ba heh shi akar



U niang long uba shait ba khlain jong u khniang FAW



Ki ksain ba la ngat pang bad kumta kim lah ban long niang long

**Ki Khniang tynrai kiba ngi
lah ban shem ha ka mariang
jong ki thain shatei lam
mihngi jong ka Ri India kiba
long ruh ki nongshun jong u
khniang Fall armyworm**

**Ki Kniang tynrai kiba don ia ka bor ban pynduna
ia ka jingroi jingpar ki paid u khniang Fall
Armyworm.**



**U ksain jong u Ichneumon
wasp**



**Ka jingsop u khniang
Cotesia spp.**



**Ka jingiap u ksain *S.
litura* na ka daw ba bam
tyllong u khniang *Chelonus
formosanus***



Metopius rufus



Microplitis manilae

**Ki kynja skain heh Tachinid parasitoids kiba ngi lah
ban shem ha ka mariang jong ka thain shatei lam
mihngi ka Ri India**



Tachina sobria



Cuphocera varia



*Turanogonia
chinensis*



Blepharella spp.



Exorista spp.

Source: ICAR-NEH, NPIB insect collection data

Ki jait kyieng ba pher ba pher kiba ngi lah ban shem ha ka mariang jong ka thain shatei lam mihngi ka Ri India



Delta pyriforme



Vespa tropica



*Dolichovespula
media*



*Polistes
olivaceus*



*Chrysis
nitidula*



*Phimenes
flavopictus*



*Priocnemis
bicolor*



*Chrysis
inaequalis*



Scolia soror



*Priocnemis
monachus*

Source: ICAR-NEH, NPIB insect collection data

**Ki khniang kiba ngi lah ban shem ha ka mariang
jong ka thain shatei lam mihngi ka Ri India**



Ophionea indica



Cicindela duponti



Cicindela sexpunctata

Source: ICAR-NEH, NPIB insect collection data

Ki Thapbawa ba don ha ka sawdong sawpud ka mariang u jingthung Riewhadem jong ka thain shatei lam mihngi jong ka Ri India.

SN	Spider types	Scientific names
A	Jumping spiders	<i>Marpissa calcuttaensis</i> <i>Phidippus spp</i>
B	Lynx Spiders	<i>Argiope pulchella</i> <i>Oxyopes rubisternum</i>
C	Wolf spiders	<i>Lycosa pseudoannulata</i>
D	Orb Spinners	<i>Lecaue decorata</i> <i>Larinia tabia</i> <i>Cyrtophora carrisae</i>

**Ki kynja phngit jingim (Entomopathogens) jong
u khniang *Spodoptera* spp. kiba don ha ka thain
shatei lam mihngi ka Ri India.**



Metarhizium (=Nomuraea) rileyi



Metarhizium anisopliae



Beauveria bassiana



Bt infected caterpillars



Baculovirus infected larvae

Ki lad jingiada da kaba pyndonkam da ki bih khniang (Chemical Control)

(Ref: OM: F. No. L3-L60/2019-SD.IV, dated 6th May 2019 and OM: F. No 12080/37/2018- PPI, dated 28th May 2019 and ICAR-IIMR Folder: Publication No./2019/02)

- Ki lad jingiada ha ka por ba u dang rit u jingthung:
Synreit da ka bih khniang NSKE (5%) lane ka Azadirachtin 1500ppm kumba shi shamoit (5ml) haka shi litar ka um ban pynduna ia ka jingmih ki khniang na ki pylleng bad ruh ban pyniap ia ki ksain rit jong u khniang FAW
- Ki lad jingiada ynda la kham heh kham san u jingthung:
Synreit da ka bih khniang Spinetoram 11.7% SC kumba 0.5 ml ha ka shi litar lane ka
Thiamethoxam 12.6% bad lambda cyhalothrin 9.5% ZC kumba 0.25 ml ha ka shi litar ka um lane ka

Chlorantraniliprole 18.5% SC kumba 0.4 ml ha ka shi litar ka um na ka bynta ki ksain heh kiba la pynjulong ia u jingthung kumba 10-20%

- Ka jingriam da ka dawai bih:
- Ka jingriam daka dawai bih ka long kaba donkam na ka bynta u ksain heh.
- Khleh milai lang ia u skop 10 kilo bad ka mithai lali 2 kilo ryngkat bad ka um 2-3 litar bad buh ia kane ka jingkhleh shimiet. Shuwa ban synreit ia kane ka jingkhleh shapoh ki sla bad ki jyntang donkam ban khleh ryngkat lang ia ka dawai bih thiodicarb kumba shiteng kynta shuwa ban synreit ia u jingthung.
- Ki lad jingiada ynda la dap 8 taiew hadien ka jingmih u jingthung bad haduh ka por ba bah khun lane mih soh:
- Ynda la bah khun u riewhadem lane la mih u soh kam long shuh kaba myntoi ban siat da ki dawai bih khniang. Lada long kaba lah ka bha ban shu shim da ka kti

Katto katne ki mat ba kongsan

1. Synreit ia ki dawai shapoh ki sla bad ki jyntang. Kynmaw ban synreit ha ka por step lane ha ka por janmiet
2. Ban ialeh pyrshah ia une u khniang donkam ia ka jingiatreilang ryngkat bad ki nongrep da kaba ai ia ki kynja awareness bad jingtip.
3. Donkam ban iada ia u jingthung ha ka por kaba biang ban lait na ka jingsaphriang jong une u khniang sha kiwei pat ki jingthung
4. Ban wanrah ia ki kynja awareness lane training ha ki bun balang kiba iadei kam bad ki nongrep
5. Ban pynduna ia une u khniang donkam ia ka jingiatreilang jong ki nongrep ha ki shnong



Photo credit; Shri P K Lynshing

Ka Jingsngewnguh

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NOTES

