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Research Article

Seed Coating; *Genius Coat Cereal Disco AG L-439*; Effect on Seed Yield and Yield Related Traits of Malting Barley (*Hordeum vulgare* L.) in Central Highlands of Ethiopia

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ABSTRACT

Source seed production demands more sensitive management with regard to soil fertility, crop rotation, space isolation, plant population, and pest management. Insect pests and seed-borne diseases are major biotic constraints that hinder production and productivity of barley in Ethiopia. Due to unavailability of improved seed coating products, growth stimulators and seed treatment chemicals, possibilities of increasing the existing seed yield of barley are limited. At the moment new seed coating substances, growth stimulators and seed treatment chemicals are emerging worldwide to enhance seedling growth and protection of seed borne pathogens and insect pests. Therefore, this experiment was conducted with the objective of examining and verifying the effect of *Genius Coat Disco Cereal AG L-439* on seed yield and yield related traits and also to determine its effective application rate for malt barley seed production. Field experiment was conducted at Holetta Agricultural Research Center main station, Adadi sub-site and Ada'aberga farmer's field in 2016 and 2017 main cropping seasons. The combined analysis of variance across locations showed significant differences ($P \leq 0.05$) among the tested treatments for plant height, above ground biomass and seed yield. The analysis of variance indicated that the tested seed coating substance named Genius Coat Disco Cereal AG L-439, at three different rates (50%, 100% and 150%) was found effective to increase the yield of malt barley by 0.94 t/ha and 0.69 t/ha when compared with the control and standard check (untreated seed and dressed by Apron star) respectively. In addition to yield gain, the field performance, reaction to insect pests and soil nutritive composition of the plots which were treated by a recommended rate or above found good. Therefore, Genius Coat Disco Cereal AG L-439 at 150% (11.25 ml/1kg seed) rate have been promoted for further confirmation test. The results of the confirmation trial revealed that the malt barley seeds, which were dressed by Apron star and coated by Genius Coat Disco Cereal AG L-439 showed better biomass increase (14.5%) and yield gain (17.2%) than the control (untreated seed) in all testing sites. The ANOVA result also showed that the response of shoot fly against exposed treatments were significantly different at $P<0.05$ in both first and second counts.

Key words: Seed coating, Malting barley, Seed treatment, Seed yield

INTRODUCTION

Barley, *Hordeum vulgare*, is an edible annual grass in the family Poaceae grown as a cereal grain crop. It is cultivated as a food cereal in the tropics and subtropics in India, Nepal, Tibet, Afghanistan, Russia, Ethiopia, North Africa and the Andean region of South America. The straw produced is used as an animal feed, bedding and to cover roofs of houses. In temperate regions, barley is used in malt production to brew beer and make other distilled alcoholic beverages, particularly whisky. Around 1 million hectares is covered with barley every year in Ethiopia (CSA, 2015). It is a tall grass with a hairy stem which stands erect and produces spikelets at the head. The stem is made up of nodes and internodes. The stem supports the inflorescence, or spike, where the grain is produced. Barley seeds heads are cylindrical spikes composed of rachis each with 3 spikelets. Each spike produces 20–60 grains. Barley plants are freely tillering and typically possesses 1–6 stems. The tillers do not produce seed heads. Barley is an annual plant which is harvested each year and it can range in height from 80 to 100 cm (Reid, 1985).

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Barley is an important cereal crop grown in most parts of Ethiopia. It is ranked fifth after tef, maize, sorghum and wheat in area under production. In the upper altitude, cool highlands of the country, it is grown for multiple purposes (food, beverage and feed). In 2014/15 cropping season, about 4.1 million smallholder farmers cultivated barley over close to 1 million ha of land and produced 1,953,385 tons (CSA, 2015). Malt barley production covers only about 150,000 ha (Lakew *et al*, 2017). According to ICARDA Press release (2016), in 2015 malt barley supply in Ethiopia met only 35% of the demand, with the remaining 65% (63,526 tons of malt) imported at a cost of 38 million USD. The favorable agro-ecology for barley in the highlands represents a huge opportunity to increase domestic malt barley production and bridge the supply and demand gap. Modern business models, such as contract farming, warehouse receipt systems and private sector investment in postharvest processing, could set up a brand-new equation between malt factories, breweries and farmers a scenario that could be game changing for the smallholder farmers, particularly in the high altitudes, where barley is one of the few crops that continue to yield well, being resilient to climate change (Garomsa, 2016).

Ethiopia's seed sector is vital to ensure the country's agricultural economic development and food security. It has become necessary to facilitate the introduction of improved seed varieties to the market; it is essential to ensure that the supply of quality seed is made available to farmers, Agro-pastoralists and other seed users as declared on Federal Democratic Republic of Ethiopia on seed proclamation number 782/2013.The fundamental challenge in achieving production increase in Ethiopia is the use of poor seed technologies. Under such conditions, possibilities of increasing the existing seed yield are limited due to unavailability of improved seed coating, growth stimulators and seed treatment chemicals. At the moment new seed coating substances, growth stimulators and seed treatment chemical technologies are emerging worldwide to enhance seed growth and for the protection of seed and soil born pests.

Production of early generation seed classes of crops like malt barley is dictated by several technical and administrative matters. Determinant technical aspects include availability of effective seed crop management practices, processing and storage systems, and standardized seed quality assurance mechanisms. Seed crops demand more sensitive management with regard to soil fertility, soil moisture, space isolation, plant population, and weed management. Moreover, use of latest seed coating substances to adhere seed treatment chemicals and growth stimulators with the seed have great advantage to reduce yield and quality losses due to poor sticking of seeds treatment chemicals and growth stimulators with the seed. Seed treatment reduces production costs of seedlings, reduces the consumption of planting seeds, facilitates mechanization of sowing and improves the seedling establishment. The generation of nano-fibers and microcapsules by the electro-spinning technique is a novel approach for active ingredient-controlled release (Dejene and Nigussie, 2015).

Seed coating is a process in which a thin and uniform polymer layer is deposited on the surface of a seed. Coating of polymer, fungicide, calcium and silicon did not affect the physiological quality of the barley seed and that the use of these products can protect the seed against pathogens without affecting the rate of emergence of the barley seedlings, while ensuring good seed appearance, adhesion, distribution and coloration. Studies have shown that a seed coating is effective in preventing and controlling mold-induced diseases and the pests causing them, promoting seedling growth and increasing yields (Wang, 2001; Qiu *et al*., 2005; Richard, 2005; Russ and David, 2005; Song *et al.*, 2005 in (Dejene and Nigussie, 2015)). A seed coating creates nitrous environment around germinating seed providing nutritional support in early phase of crop development (Taylor & Herman, 1998). Seed coating, in the broadest sense, includes any process for the addition of materials to the seed; in the simplest form, it is the direct application of a material to seeds. The term "coated seed" has been defined as a seed that has been pelleted, tableted, or taped. "seed coating" is used to denote the application of a useful material (s) to the seed without changing its general size or shape. The term "pelleted seeds" refers to the addition of inert fillers to increase the apparent seed size and weight (Taylor and Harman, 1990). Seed coatings are not always successful and is only there to improve the survival rate of seed that germinate (Dowling *et al.*, 1971.). Seed coatings were developed to also increase the ease of handling, to have a heavier and more uniform seed (McDonald, 1998).

The Genius Coat actives boost crop nutrition and stimulate root development and mass. By nurturing the seed, a chain reaction is triggered that reinforces the entire growth period, ultimately maximizing yield potential. Fungicide seed treatments keep seed viability and inhibit the invasion of fungal pathogens causing seed rot and seedling blight. Seed treatments work to protect the seed in two ways: controlling fungal pathogens present either on the seed surface or carried internally in the seed; and controlling fungal pathogens present in the soil or sporulating on organic matter in the soil.The seed dressing chemical; Apronstar 42 WS; is a pesticide, which has got both insecticidal and fungicidal effect. When applied on the seeds, it has both contact and systemic action. Soil born insect pests and disease-causing pathogens are controlled by contact while diseases like downy mildew, smut and the early sucking insect pests are controlled through systemic means. The systemic ones are absorbed from treated seed by roots and taken up through the plant system and controls insects like shoot fly, aphid and jassids; in addition, the early season diseases such as smut and downy mildew controlled (Brooks, 1953). At the moment new seed coating substances, growth stimulators and seed treatment chemicals are emerging worldwide to enhance seed growth and for the protection of seed or soil born pests. Among many, insect pests such as Russian wheat aphid and shoot fly are some of the major biotic constraints of its production and productivity (Tadesse, 2006). Therefore, this experiment was conducted with the objective of examining and verifying the effect of *Genius Coat Cereal Disco AG L-439* on seed yield, yield related traits and on early stage crop pests; and also to determine its effective application rate for malt barley seed production.

MATERIALS AND METHODS

Study area descriptions

The experiment was conducted under field conditions at three locations: Holetta agricultural research center main testing site; Adadi sub-testing site and Ada'aberga farmer's field western Ethiopia during the main cropping seasons of 2015/16-2017. The sub-sites have an altitude of 1936-2400 m.a.s.l and represent the mid to high altitude agro-climatic zone. The farming system of the study areas are mixed crop livestock production system.

Seed of IBON 174/03, released variety of malt barley, was used for the trials. The treatment rates were allocated based on the recommended rate (100%) of INCOTEC Company i.e., 7.5ml Genius Coat per one-kilogram seed; 50% lower (3.75ml Genius Coat per one-kilogram seed) and 50% higher (11.25ml Genius Coat per one-kilogram seed) rate of the recommendation were evaluated. Apronstar 42WS and untreated seed were used as standard and local check, respectively (Table 1).

The experiment was planted in randomized complete block design (RCBD) in four replications with plot size of 2.5 m*1.2 m (3 m^2). The space between blocks, plots and rows were 1 m, 0.5 m, and 0.2 m, respectively and that of confirmation trial were planted on 10X10-meter large plots without replication but planted over three locations. All agronomic practices were applied as per the recommendations. The recommended seed rate was 100 kg/ha and planting were done manually by drilling. Composite soil samples were taken from each experimental site before planting and from each plot after harvest. Each soil sample was taken for the analysis of soil Organic Matter, pH, total N and available P at Holetta Agricultural Research Center Soil Laboratory. Seed was coated by using seed coater for even distribution of the seed treatment chemical and the coating substance.

Confirmation trial treatment

The field experiment was conducted at three locations in the central highlands of Ethiopia (Holetta Agricultural Research Center main station, Adadi sub-site and Ada'aberga farmer's field) in 2017 main cropping season to verify treatment dose11.25ml Genius Coat per one-kilogram seed was allocated based on pre-verification recommendation on the same crop and coating substance. Similarly, Apronstar and untreated seed were used as standard and local checks, respectively (as below Table 2). In each site, un-replicated three plots of 10m x 10m were planted with malt barley seed (IBON 174/03). The space between plots & rows were 1.5 m, & 0.2 m, respectively.

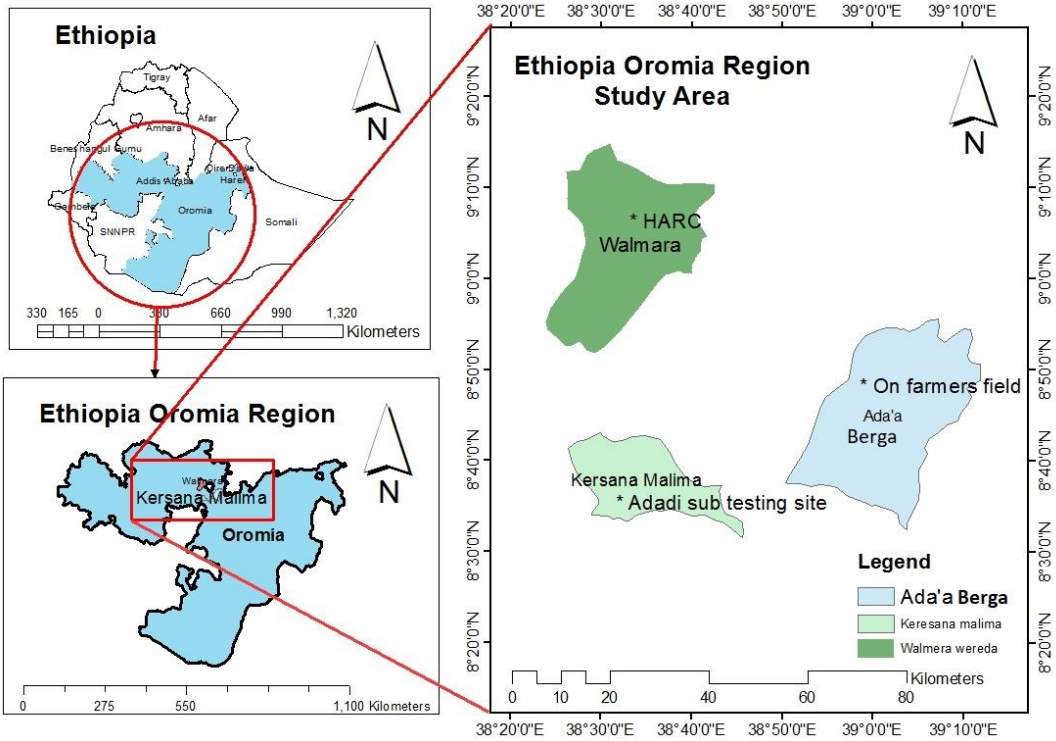


Fig. 1: Study areas.

Table 1: Treatment details of trial one

Treatments	Rate of application of Genius Coat Disco Cereal AG L-439 per kg of seed
Standard check	2.5g Apronstar 42WS + 10ml water
Local check	Untreated seed
50% below	3.75ml Genius Coat Disco Cereal AG L-439 + 2.5g Apronstar 42WS + 9ml water
100% candidate	7.5ml Genius Coat Disco Cereal AG L-439 + 2.5g Apronstar 42WS + 5ml water
150% above	11.25ml Genius Coat Disco Cereal AG L-439 + 2.5g Apronstar 42WS + 1ml water

Table 2: Confirmation trial details

Treatments	Rate of application
Control	Untreated seed
Standard check	2.5g Apronstar 42WS + 10ml water
Candidate	11.25ml Genius Coat Disco Cereal AG L-439 + 2.5g Apronstar 42WS + 1ml water

Soil analysis

Soil samples before planting were randomly collected from the experimental locations at a depth of 20-30 cm using an auger and collected samples were mixed to produce one representative composite sample of 1kg. Soil Samples were also taken later at harvest from each plot.

Collected data and statistical analysis

Phenological data, stand count at emergence and maturity, disease and insect pest score, plant height (cm), number of seeds per spike, biomass yield (t/ha), seed yield (t/ha), thousand seed weight (g), harvest index and soil analysis data were compared with initial soil analysis result using excel. Differences between treatments were tested using analysis of variance (ANOVA) procedures of SAS to compare treatment means (SAS v 9.3, GLM, 2014). Least significance difference (LSD) at 5% significance level was used for comparison of means. As a general rule, the amount of stover produced is about the same as the amount of grain produced. This is commonly expressed in a ratio called harvest index. Harvest index is defined as the pounds of grain divided by the total pounds of above ground biomass (Pennington, 2013).

Harvest index = lbs of grain / (lbsstover + lbs grain)

RESULTS AND DISCUSSION

The combined analysis of variance across locations showed significant (P≤0.05) differences among the tested treatments for seed yield and harvest index, (Table 3). Whereas, other tested parameters were not statistically significant. The highest seed yield (4.11 t/ha) was obtained at 150% rate, while the lowest yield (3.17 t/ha) was obtained from the local check. Results of the pre-verification test (Table 3) revealed that the candidate seed coating substance, Genius Coat Cereal Disco AG L-439 at a rate of 11.25 ml per one-kilogram seed of malt barley had got better yield gain (20% from the standard check and 30% from the local check) in all testing sites.

The analysis of variance clearly showed that (Table 4) the response of insect pests against exposed treatments were not significantly different at P≤0.05. The data were transformed using square root transformation procedures. Even if ANOVA showed non-significant difference among treatment means, shoot fly and cricket damage at Holetta and Ada'aberga were less compared to Adadi location, this implies seed treatments are highly influenced by different locations. Generally, plots treated with Treatment 4 (100%) were good in performance at field condition compared to other plots with respect to insect pest. The infestation level of shoot fly at Holetta, Ada'aberga and Adadi were higher at untreated (local check) compared to standard check, treatment 3 (50%), treatment 4 (100%) and treatment 5 (150%). Shoot fly Population fluctuations were observed during seedling stage at three locations this was may be due to accidental high rain fall.

Analysis of soil chemical properties (pH, total N, OM and P) was done at Holetta Agricultural Research Center Soil Laboratory for the composite samples collected from the experimental sites (Holetta, Ada'aberga and Adadi) before planting and plot-based samples after harvest. ANOVA result showed none significant variation among treatments for pH and percentage of total nitrogen. While there were significant differences among treatments and also with samples collected before planting for phosphorus and organic matter content. Treatment 5 (150%) showed least phosphorus content (9.87 ppm) which might be due to its conversion into available form. Moreover, organic matter content of treatment 5 (150%) and sample collected before planting were better than the rest treatments as shown in Table 5.

Table 3: Effect of Genius Coat Disco Cereal AG L-439 on yield and yield related parameters of malt barley at Holetta, Ada'aberga and Adadi sites in 2016

Treatments	Yield and yield components				
	SPS	BMS(t/ha)	Yield (t/ha)	TSW(g)	HI
Standard check (01)	22.03	8.2	3.44c	48.7	0.44ab
Local check (02)	22.02	8.7	3.17d	48.5	0.38b
50% (03)	22.07	8.9	3.24cd	47.7	0.38b
100% (04)	21.42	8.6	3.82b	48.2	0.46a
150% (05)	22.35	8.4	4.11a	49.2	0.51a
Mean	21.98	8.6	3.56	48.46	0.43
LSD (0.05)	NS	NS	0.24	NS	0.07
CV	9.28	16.55	8.14	4.58	20.57

*SPS=Seeds per spike, BMS=Above ground biomass, TSW=Thousand seed weight & HI=Harvest index; *Means followed by the same letter along column are not statistically different from each other at 5%. probability level.

Table 4: Response of major insect pests against Apronstar 42WS + Genius coat at Holetta, Ada'aberga and Adadi locations 2016 main cropping season

Treatment	HARC Damaged by shoot fly	Ada'aberga Damaged by shoot fly	Adadi Damaged by shoot fly	HARC Damaged by cricket	Ada'aBerga Damaged by cricket	Adadi Damaged by cricket
S/check	3.44	1.7	8.63	2.31	1.36	3.21
L/check	3.85	2.05	9.79	1.56	1.76	3.34
50%	3.61	2.06	8.82	1.74	1.61	3.49
100%	3.33	1.64	9.41	1.98	1.18	3.52
150%	3.67	1.86	9.71	1.81	1.7	3.38
LSD (0.05)	NS	NS	NS	NS	NS	NS
CV	24.7	15.7	8.27	38.7	30.75	11.4

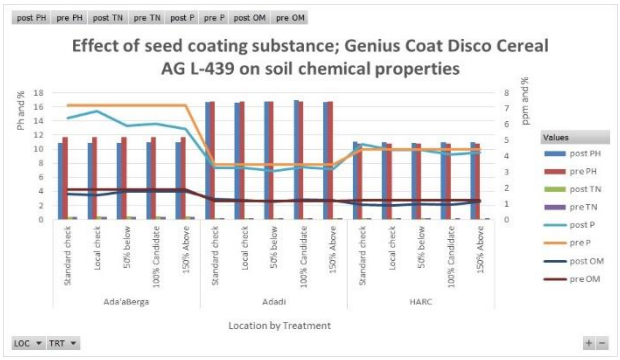


Chart 1: Effect of seed coating substance; Genius Coat Disco Cereal AG L-439 on soil chemical properties.

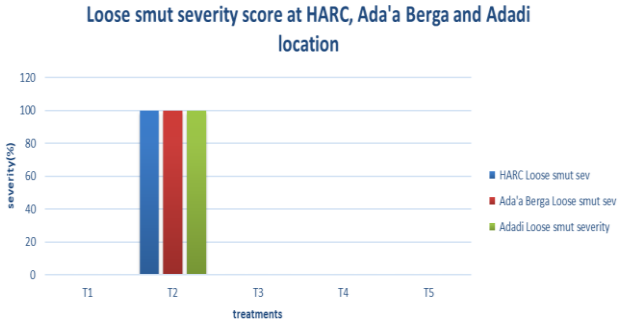


Chart 2: Response of loose smut against Genius Coat Disco Cereal AG L-439 on three Location.T1= Standard check, T2=Local check, T3=50% below, T4= 100% Candidate, T5=150% Above.

Table 5: Effect of Genius Coat Disco Cereal AG L-439 on soil chemical properties at Holetta, Ada'aberga and Adadi sites in 2016

Treatments	Soil chemical properties			
	pH	% TN	P (ppm)	% OM
Standard check	5.74	0.134	10.85ab	2.93ab
Local check	5.71	0.139	10.88ab	2.77b
50%	5.72	0.141	10.03bc	2.96ab
100%	5.78	0.139	10.12bc	3.01ab
150%	5.72	0.135	9.87c	3.13a
Before planting	5.83	0.135	11.37a	3.26a
Mean	5.75	0.137	10.52	3.01
LSD (0.05)	NS	NS	0.95	0.36
CV	2.85	16.51	11.04	14.63

*pH=Power of hydrogen, TN=Total nitrogen, P=Phosphorus & OM=Organic matter; *Means followed by the same letter along column are not statistically different from each other at (at 5%).

Table 6: Effect of Genius Coat Disco Cereal AG L-439 on Agronomic Traits of malt barley at Holetta, Ada'aberga and Adadi sites in 2017

Treatments	Agronomic Traits		
	PH (cm)	SL (cm)	SPS
Control	81.9b	7.2	26.6
Standard check	82.1b	7.3	26.9
Candidate	86.9a	7.6	27.6
Mean	83.6	7.4	27.0
LSD (0.05)	4.15	NS	NS
CV	2.19	5.99	3.26

*PH=Plant height, SL=Shoot length & SPS=Seeds per spike, standard check=2.5g Apronstar 42WS + 10ml water, candidate=11.25ml Genius Coat Disco Cereal AG L-439 + 2.5g Apronstar 42WS + 1ml water.*Means followed by the same letter along column are not statistically different from each other at 5% probability level. *NS=None significant.

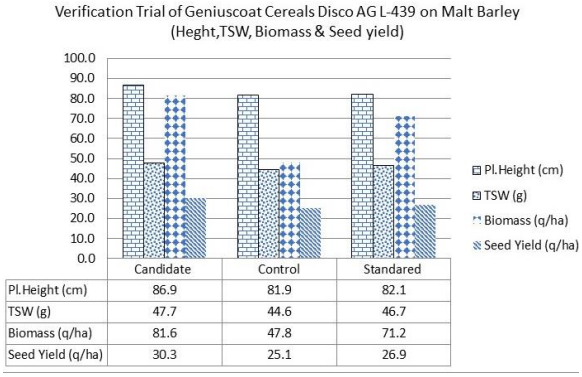
The present investigation revealed that no smut incidence recorded on seeds dressing with ApronStar 42WS and coated with different rates of Genius coats and seeds dressed with ApronStar 42WS also good compared to the untreated check. This result is in line with Dejene and Nigussie (2015) as lower smut incidence recorded on seeds dressing with Thiram when treated with Disco plus Genius coats, and seeds dressed with Apron Star also when treated with Disco and Genius coats.

Confirmation trial result

The combined analysis of variance across locations for confirmation trial showed significant ($P \leq 0.05$) differences among the tested treatments for plant height, above ground biomass and seed yield, (*Table 6 and 7*). Whereas, other tested parameters were not statistically significant. As indicated in the Table 6 and Chart 3, the candidate had the tallest plant height (86.9 cm) when compared to the standard check (82.1 cm) and the control (81.9 cm). In agreement with Taylor & Herman (1998), variations among treatments could be due to the nature of the coating substance that can create nitrous environment around germinating seed which provide nutritional support in early phase of crop development. Our result also supported by Dejene and Nigussie (2015). Application of chemical fungicides for the control of loose smut did not show significant difference in plant height but maximum plant height 107.77 cm was recorded in plots that received seed treated with Thiram when coated with Disco plus Genius coats as well as seeds coated with Genius coat only, in comparison to 97.53 cm plant height in seeds treated with Propiconazole.

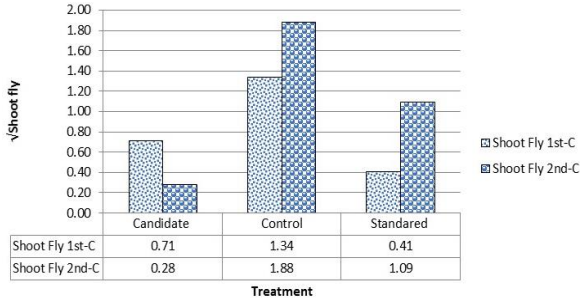
The highest above ground biomass (81.6 q/ha) and seed yield (30.3 q/ha) were obtained from the candidate, while the lowest above ground biomass (69.8 q/ha) and seed yield (25.1 q/ha) were found from the control (Table 7 and Chart 3). Results of the verification trial revealed that the malt barley variety IBON 174/03, which was dressed by Apron star and coated by Genius Coat Disco Cereal AG L-439 showed better biomass increase (about 14.5%) and yield gain (about 17.2%) from the control (untreated seed) in all testing sites. Moreover, the ANOVA result revealed that the yield gain of the candidate was 3.4 quintals per hectare (11.2%) than the standard check (Table 7). Similarly, studies on Fungicide treated seed result in highly and significantly ($p \leq 0.01$) reduced loose smut and increased yield of barley at two locations by varying levels over the untreated control except the yields from plots sown with seeds treated with Propiconazole. Seed treatment with Thiram and dressed with Disco plus Genius coats resulted in the maximum yield 1761.0 kg ha^{-1}(Dejene and Nigussie, 2015). This needs further profitability study.

There was no occurrence of seed borne pathogens during the experimental periods at the three testing sites. The ANOVA result showed that (Table 8 and Chart 4) the response of shoot fly against exposed treatments were significantly different at $P<0.05$ in both counts. The highest infestation rate of shoot fly (1.34) in the first count was recorded from the control (un-treated seed) while the lowest (0.41) was detected from the standard check. Similarly, in the second count, there was highest infestation rate of shoot fly (1.88) on the control, while



	Candidate	Control	Standared
Pl.Height (cm)	86.9	81.9	82.1
TSW (g)	47.7	44.6	46.7
Biomass (q/ha)	81.6	47.8	71.2
Seed Yield (q/ha)	30.3	25.1	26.9

Chart 3: Effect of GeniusCoat Cereals Disco AG L-439 on plant Height, TSW, Biomass & Seed yield.



	Candidate	Control	Standared
Shoot Fly 1st-C	0.71	1.34	0.41
Shoot Fly 2nd-C	0.28	1.88	1.09

Chart4: GeniusCoat Cereals Disco AG L-439 against Shoot fly(square root transformed data).

Table 7: Mean values of yield and yield related parameters of malt barley seed coating substance (Genius Coat Disco Cereal AG L-439) experiment conducted at Holetta, Ada'aberga and Adadi sites in 2017 main cropping season

Treatments	Yield and yield related parameters			
	TSW(g)	BMS(q/ha)	SY (q/ha)	HI
Control	44.6	69.8b	25.1c	33.0
Standard check	46.7	71.2b	26.9b	38.1
Candidate	47.7	81.6a	30.3a	36.0
Mean	46.3	74.2	27.4	35.7
LSD (0.05)	NS	6.11	1.81	NS
CV	3.03	3.63	2.91	11.98

* TSW=Thousand seed weight, BMS=Above ground biomass, SY=Seed yield & HI=Harvest index, standard check=2.5g Apronstar 42WS + 10ml water, candidate=11.25ml Genius Coat Disco Cereal AG L-439 + 2.5g Apronstar 42WS + 1ml water. *Means followed by the same letter along column are not statistically different from each other at 5% probability level. *NS=None significant

Table 8. Mean values of shoot fly counts of malt barley seed coating substance (Genius Coat Disco Cereal AG L-439) experiment conducted at Holetta, Ada'aberga and Adadi sites in 2017 main cropping season

Treatments	Shoot fly counts	
	SC-1	SC-2
Control	1.34a	1.88a
Standard check	0.41b	1.09ab
Candidate	0.71b	0.28b
Mean	0.82	1.09
LSD (0.05)	0.46	0.96
CV	24.75	39.12

*SC-1=Shoot fly first count & SC-2=Shoot fly second count, standard check=2.5g Apronstar 42WS + 10ml water, candidate=11.25ml Genius Coat Disco Cereal AG L-439 + 2.5g Apronstar 42WS + 1ml water. *Means followed by the same letter along column are not statistically different from each other at 5% probability level.

the least (0.28) was observed on the candidate at seedling stages. This could be due to the effect of the seed coating and dressing (Apronstar 42WS) material for the control of seedling from shoot fly infestation.

In general, the results of the field experiments at the three testing sites showed that the candidate seed coating substance had statistical and numerical increases in the given parameters when compared to the control. Nevertheless, in most of the parameters the candidate and the standard check gave more or less comparable results. Moreover, seed treatment efficacies were increased when treatments were supplemented with coating materials (viz. Disco coat and Genius coat) the Genius coat together with Thiram showed the minimum loose smut disease incidence 1.85% next to seeds treated with Propiconazole 0.00% incidence (Dejene and Nigussie, 2015).

Conclusion and Recommendation:

The analysis result for the collected field data indicated that the tested seed coating substance, Genius Coat Disco Cereal AG L-439, at three different rates (50%, 100% and 150%) was found effective to increase the yield of malt barley by 0.94 t/ha and 0.69 t/ha when compared with the control and standard check (untreated seed and dressed by Apron star) respectively. In addition to yield gain, the field performance, reaction to insect pests and soil nutritive composition of the plots which were treated by a recommended rate or above found good. Therefore, Genius Coat Disco Cereal AG L-439 at 150% (11.25 ml/1kg seed) rate could be promoted for further verification test. Based on the previous year result, which was conducted in 2016/17 main cropping season, and its continuation trial in 2017 revealed that the candidate seed coating product (Geniuscoat Cereals Disco AG L-439) has better performance than the control in some field experiment parameters. While, there were no big statistical or numerical differences observed between the candidate and the standard check in most parameters. Therefore, with the existing result and field observation found the candidate seed coating product could be recommended at the rate of 11.25 ml/kg for malt barley seed as an alternative seed coating substance with appropriate seed dressing chemicals in Ethiopia.

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