

Professional Application of Fertilizer Chemicals

Exam name: **Prusa Fertilizers EXAM A**

Please select the correct response and mark your online answer sheet located at:

<https://prusaassociates.wufoo.com/forms/z182qk5p1qgepqq>

(Copy this link and paste it into your browser. A 'password' will be provided.)

Mark only one response per question.


- There are a total of **65** questions in this exam.
- **60** questions are worth 1% point each.
- **5** questions highlighted in **yellow** are worth 8% points each.







This exam may be downloaded at this link:


www.PrusaAssociates.com/exams/QPCAT/QPCAT_Fertilizers_Exam_A.doc

1.	Plants and turfgrass only uptake required nutrient elements in very specific, non-organic ionic forms.	<input type="radio"/> A True	<input type="radio"/> B False			
2.	The three (3) numbers required by advanced nations on a bag of fertilizer (X-X-X) represent the percentage % of the pure chemical elements of nitrogen, phosphorus and potassium by weight.	<input type="radio"/> A True	<input type="radio"/> B False			
3.	<u>Buffer</u> pH is lower in sand soils than in heavier clay or organic soils and can account for rapid changes in soil pH that can greatly affect nutrient availability in sand.	<input type="radio"/> A True	<input type="radio"/> B False			
4.	It is usually not necessary to add phosphorus to most soils and should only be done so after careful soil testing verifies inadequate levels of this nutrient present.	<input type="radio"/> A True	<input type="radio"/> B False			
5.	On cool season and many warm season grass greens (especially where clippings are constantly removed), nitrogen is the nutrient element that must be applied in the greatest quantity and demand can range from 22 grams / M ² to as high as 40+ grams / M ² per year depending on many factors including play/wear levels.	<input type="radio"/> A True	<input type="radio"/> B False			
6.	It is professionally acceptable to mix fertilizers into a spray tank and leave this unattended or overnight.	<input type="radio"/> A True	<input type="radio"/> B False			
7.	To accurately cost compare fertilizer you can simply compare the cost of one bag of a fertilizer to one bag of another fertilizer as long as the bags weigh the same.	<input type="radio"/> A True	<input type="radio"/> B False			
8.	QUESTION IS WORTH 8% of EXAM What is the least expensive <i>nitrogen cost</i> of these two fertilizer products: (1) 21-0-0 at 22000 pesos per metric ton (2) 15.5-0-0 at 17000 pesos per metric tom	<input type="radio"/> A (1) 21-0-0	<input type="radio"/> B (2) 15.5-0-0	<input type="radio"/> C Need more information	<input type="radio"/> D Both cost about the same	<input type="radio"/> E The one with "P" is least Costly.
9.	The 'pH' of the water used to mix fertilizers in a spray tank has no impact on the solubility of the fertilizer.	<input type="radio"/> A True	<input type="radio"/> B False	<input type="radio"/> C	<input type="radio"/> D	<input type="radio"/> E
10.	Compatibility of fertilizers for mixing in spray solutions can be checked using a <i>Compatibility Chart</i> . Another good way is to mix them in the intended ratio in a clear jar – if the solution remains clear and stable, then they are compatible in solution.	<input type="radio"/> A True	<input type="radio"/> B False			
11.	A <i>low-cost and effective</i> source of nitrogen (N), in order to prevent explosions <i>Ammonium nitrate</i> fertilizer (rapid oxidizer) needs to be safely stored away from heat, hydrocarbons (even water) and not stacked to cause pressure.	<input type="radio"/> A True	<input type="radio"/> B False			

12. Which of the following nitrogen fertilizer is the least effective in cool temperatures due to it's need to react with soil enzymes:	<input type="radio"/> A Calcium nitrate	<input type="radio"/> B Ammonium sulfate	<input type="radio"/> C Iron sulfate	<input type="radio"/> D Urea	<input type="radio"/> E None of these
13. When spraying soluble fertilizer on turf it is usually necessary to reduce the risk of phytotoxic 'burning' of leaves by lightly watering in.	<input type="radio"/> A True	<input type="radio"/> B False			
14. While the application of pesticides requires a sophisticated level of education and training, fertilizers do not require any special knowledge to apply.	<input type="radio"/> A True	<input type="radio"/> B False			
15. "Salt index" of fertilizers is critical knowledge to know and understand when it comes to applying soluble sprays or granular products to fine turfgrass. It is a precise measure of the different burn potential of each fertilizer.	<input type="radio"/> A True	<input type="radio"/> B False			
16. Which fertilizer is potentially the greatest pollution risk to the overall environment plus aquatic sites and have been shown to cause severe algae outbreaks on putting greens and ponds?	<input type="radio"/> A Slow release nitrogen fertilizers	<input type="radio"/> B Iron sulfate	<input type="radio"/> C Phosphorus fertilizers	<input type="radio"/> D All of these	<input type="radio"/> E None of these
17. The use of hand-held, spray wands that persist in use in Asia are simply inaccurate in their ability to apply precision applications of liquid fertilizers.	<input type="radio"/> A True	<input type="radio"/> B False			
18. Dr. Wayne Jordan, head of the Georgia Soils Testing Lab in the United States says that only 36% off all soil samples his lab receives are low in available phosphorus (P). This is typical in regions of the world. Applying additional phosphorus fertilizers in most cases is unnecessary and a waste of money.	<input type="radio"/> A True	<input type="radio"/> B False			
19. It is professionally advisable to conduct ongoing simple fertilizer trials at your golf courses to test and monitor different rates and formulations, because each property differs in the complexity of its soil chemistry and it is wise to test for the best combinations.	<input type="radio"/> A True	<input type="radio"/> B False			
20. Plants and turfgrass uptake nitrogen in the form of:	<input type="radio"/> A Elemental nitrogen (N)	<input type="radio"/> B N ₂ gas	<input type="radio"/> C As either nitrate or ammonium ions	<input type="radio"/> D As NO ₃ ⁻ or as NH ₄ ⁺	<input type="radio"/> E C and D

<p>21. Urea fertilizer must be 'hydrolized' by the enzyme <i>urease</i> into ammonium ion before it can be utilized by the plant. This takes place rapidly in warm soils with adequate moisture.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			
<p>22. What is your assessment of the application shown in this photo?</p> 	<p><input type="radio"/> A This appears to be a very low pressure, low volume spray application.</p>	<p><input type="radio"/> B The picture shows an excellent application method.</p>	<p><input type="radio"/> C This is obviously a poorly adjusted machine that is applying a non-uniform application pattern.</p>	<p><input type="radio"/> D A and B</p>	<p><input type="radio"/> E None of these</p>
<p>23. For over 150 years foliar absorption of nutrients in plants has been acknowledged. In recent years it has been clearly identified using radio-isotopes. Leaf absorption, crown absorption, and root absorption all take place when applying liquid fertilizers.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			
<p>24. Applying iron sulfate at a rate above 4 grams of PRODUCT per square meter can result in a very dark, blackened appearance to turf, but at proper rates a dark green color results.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			
<p>25. Adjuvants such as wetting agents or surfactants may be added to liquid fertilizers provided you consider:</p>	<p><input type="radio"/> A They must be compatible with the fertilizer – do a jar test</p>	<p><input type="radio"/> B You must be cautious as they will effectively enhance the impact of salt index of the fertilizer</p>	<p><input type="radio"/> C It is wise to first test such a spray mixture to assure that no phytotoxic damage will occur</p>	<p><input type="radio"/> D It is wise to consult technical literature and others with experience in such mixtures</p>	<p><input type="radio"/> E All of these</p>
<p>26. Selecting nozzles is critical for setting up your liquid fertilizer spray application. To encourage foliar uptake for a fertilizer mixture one would:</p>	<p><input type="radio"/> A Select small orifice nozzles and higher pressure to mist the spray to cover leaves thoroughly</p>	<p><input type="radio"/> B Select large orifice nozzles and low pressure to drench the leaves</p>	<p><input type="radio"/> C Select soil drench nozzles</p>	<p><input type="radio"/> D None of these</p>	<p><input type="radio"/> E All of these</p>
<p>27. In spreading dry fertilizers, mechanical spin-type spreaders are commonly used today and require precise calculations and adjustments just as with spray equipment.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			

<p>28. The use of back-pack blowers for dry chemical applications:</p>  	<p><input type="radio"/> A Is a very accurate and precise method for applying accurate rates of fertilizers to fine turf such as greens</p>	<p><input type="radio"/> B Is simply NOT a very accurate method for applying precise rates of fertilizers to greens</p>	<p><input type="radio"/> C Could be used for applications other than products that require accurate and safe rates</p>	<p><input type="radio"/> D Is very useful to applying dry fertilizer materials in heavy sloped areas, around bunkers and difficult to reach areas that do not require precision rates of application</p>	<p><input type="radio"/> E B, C and D</p>
<p>29. This is an example of an acidic fertilizer that will lower pH over time:</p>	<p><input type="radio"/> A Calcium nitrate 15.5-0-0</p>	<p><input type="radio"/> B Potassium nitrate 13-0-5</p>	<p><input type="radio"/> C Calcium carbonate (Lime)</p>	<p><input type="radio"/> D Ammonium sulfate 21-0-0</p>	<p><input type="radio"/> E None of these</p>
<p>30. This is an example of a basic fertilizer that will raise pH over time:</p>	<p><input type="radio"/> A Calcium nitrate 15.5-0-0</p>	<p><input type="radio"/> B Urea 46-0-0</p>	<p><input type="radio"/> C Diammonium phosphate 18-46-0</p>	<p><input type="radio"/> D Ammonium sulfate 21-0-0</p>	<p><input type="radio"/> E None of these</p>
<p>31. Fertilizers are evaluate in "<i>Lime Equivalency</i>" to quantify their impact on pH.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			
<p>32. "<i>Buffer</i>" <i>adjuvants</i> are added to the water solution in a spray tank to neutralize the impacts of the water pH on fertilizers and pesticides.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			
<p>33. In order to have healthy roots it is necessary to constantly add phosphorus to soils. The more you do this the better the rooting will be.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			
<p>34. Every fertilizer that contains nitrogen (N) will provide the same resulting plant growth response.</p>	<p><input type="radio"/> A True</p>	<p><input type="radio"/> B False</p>			
<p>35. If you continually use these fertilizers on your sand based golf greens the pH will tend to:</p>  	<p><input type="radio"/> A Remain the same</p>	<p><input type="radio"/> B Tend to raise pH</p>	<p><input type="radio"/> C Tend to lower pH</p>	<p><input type="radio"/> D Become a Buffer pH</p>	<p><input type="radio"/> E None of these</p>
<p>36. If you continually use these fertilizers on your sand based golf greens the pH will tend to:</p>  	<p><input type="radio"/> A Remain the same</p>	<p><input type="radio"/> B Tend to raise pH</p>	<p><input type="radio"/> C Tend to lower pH</p>	<p><input type="radio"/> D Become a Buffer pH</p>	<p><input type="radio"/> E None of these</p>

37. Fertilizers are chemically rated in 'Lime Equivalency' that quantitatively indicates their potential for:	O A Reducing salinity	O B 'Sweetening' the soil	O C Adding calcium (Ca)	O D Adding magnesium (Mg)	O E Impacting pH
38. As the pressure is increased in a liquid sprayer:	O A Droplet size gets smaller	O B Risk of 'drift' increases	O C It has no impact	O D None of these	O E A & B
39. QUESTION WORTH 8% of EXAM If your area of greens on an 18-hole golf course totals 1.0 hectares, how much total Urea (46-0-0) would you need to make an application of 1.0 grams of available N per square meter?	O A 10,000 grams	O B 217 grams	O C 50 kilograms	O D 21.7 kilograms	O E 217 kilograms
40. If you have irrigation water that contains above average levels of sodium and your soils have alkali pH levels, what chemicals would you use?	O A Dolomitic lime; calcium nitrate	O B Lime, potassium nitrate and calcium nitrate	O C Gypsum, ammonium sulfate, urea	O D I would ask my fertilizer supplier	O E None of these
41. QUESTION WORTH 8% of EXAM You need to make an application of 1.0 grams per square meter of actual available nitrogen to 1.0 hectares total area of golf greens. You must determine the correct product selection to provide your golf operation the best actual price. <u>Assuming that the growth response and play quality will be the same</u> , which below product provides the best true cost and proper business decision? Ammonium Sulfate @ 380 pesos per 20 kilogram bag Urea @ 700 pesos 20 kilogram bag 12-3-24 @ 195 pesos per 20 kilogram bag	O A 12-3-24 @ 9750 pesos per metric ton.	O B NOT Urea @ 35,000 pesos per metric ton	O C 21-0-0 @ only 90 pesos per kilogram of N	O D Urea @ a cost of 0.076 pesos per gram of N per square meter	O E None of these
					
42. Nitrogen is an example of:	O A A nutrient that is immobile in the plant.	O B A nutrient that is mobile in the plant.	O C A nutrient deficiency that will cause yellowing of new leaves.	O D A nutrient deficiency that will cause yellowing of older leaves.	O E B and D
43. Turfgrass plants can immediately and readily uptake NH ₄ ⁺ and NO ₃ ⁻ .	O A True	O B False			

44. It has long been known in horticulture that making liquid applications of nitrogenous fertilizers such as urea in combination with soluble iron products enhances a more rapid uptake of both nutrients.	<input type="radio"/> A True	<input type="radio"/> B False
45. Fertilizer trial evaluation plots provide valuable proof of your products and management decisions that can be used for staff training, customer relations, and to provide visual proof to your bosses that you are doing the right things.	<input type="radio"/> A True	<input type="radio"/> B False
46. A phosphorus (P) deficiency will usually manifest the visual symptoms of purplish coloring of the youngest leaves.	<input type="radio"/> A True	<input type="radio"/> B False
47. There are legal licensing requirements rapidly being implemented in Europe and North America for <u>applicators of fertilizers</u> -- in addition to long standing requirements for chemical pesticide applicator licensing.	<input type="radio"/> A True	<input type="radio"/> B False
48. Unskilled, untrained, and uneducated people should not apply or have any decision making for application of fertilizers and agricultural chemicals.	<input type="radio"/> A True	<input type="radio"/> B False
49. It is imperative that golf course managers keep accurate use and financial records for fertilizers and other chemicals. At a minimum this should include product name; product ingredients (chemical or nutrient percentages); rate of application of actual per square meter; area applied; date; method; conditions.	<input type="radio"/> A True	<input type="radio"/> B False
50. A golf course manager should exactly know at any point the amount of available nutrient elements that have been applied to each play area of the course – tracking year-to-date grams per square meter of at least nitrogen (N).	<input type="radio"/> A True	<input type="radio"/> B False
51. A golf course superintendent DOES NOT need to have a basic education and working knowledge of chemistry.	<input type="radio"/> A True	<input type="radio"/> B False
52. If you have high pH alkali soil conditions acidifying fertilizer materials such as ammonium sulfate, urea are advised and in addition elemental sulfur (S) can be prescribed.	<input type="radio"/> A True	<input type="radio"/> B False
53. For alkali, high pH sodic soils, Dolomitic lime is a good source that will provide calcium.	<input type="radio"/> A True	<input type="radio"/> B False

<p>54. Proper calibration of application equipment is essential for accurate application of fertilizers and chemicals. One way to calibrate a large sprayer is to fill it with water; apply an application of water to a known square area of about 50 m² so you will know just how many square meters that machine will do when it is filled.</p>	<p>O A True</p>	<p>O B False</p>
<p>55. Sandy soils such as USGA conforming putting greens have the capacity to store more nutrient elements than heavier, native soils.</p>	<p>O A True</p>	<p>O B False</p>
<p>56. Fertilizers with a high salt index can desiccate turfgrass plants by diffusion.</p>	<p>O A True</p>	<p>O B False</p>
<p>57. Phosphorus is both mobile in the turfgrass plant and in the soil. It is a major detrimental cause of algae (cyanobacteria) blooms in waterways and on golf course greens.</p>	<p>O A True</p>	<p>O B False</p>
<p>58. Apply excess fertilizer nutrient elements cannot cause harm to the turfgrass plant, but will usually boost its growth and strength.</p>	<p>O A True</p>	<p>O B False</p>
<p>59. When mixing various liquid fertilizers or with pesticides it is best to do a 'jar test' to make sure they are compatible. If they gel, curdle, sludge or precipitate any solids then they may not be good to mix.</p>	<p>O A True</p>	<p>O B False</p>
<p>60. Adjuvants are neutral and harmless chemicals such as 'surfactants' and 'spreaders,' but they should be used cautiously with high salt index liquid fertilizers to avoid burning.</p>	<p>O A True</p>	<p>O B False</p>
<p>61. Adding in small amounts of colorants to liquid fertilizers can assist in identifying where you have sprayed.</p>	<p>O A True</p>	<p>O B False</p>
<p>62. The Minimum Levels for Sustainable Nutrition (MLSN) guidelines for levels of soil nutrients promulgated by PACE Turf and Dr. Micah Woods are excellent guidelines when carefully fine-tuned for amounts of play wear and expected course condition quality.</p>	<p>O A True</p>	<p>O B False</p>
<p>63. In sports turfgrass management, Nitrogen (N) is the <i>most important, key nutrient element</i> that impacts uptake of all other nutrient elements.</p>	<p>O A True</p>	<p>O B False</p>

64. QUESTION WORTH 8% of EXAM	O A 0.5 g / m ²	O B 0.75 g / m ²	O C 1.2 g / m ²	O D 1.0 g / m ²	O E None of these
<p>You have 19 golf course greens each with 500 square meters of surface areas. If you have just used 54.3 kilograms total of ammonium sulfate (21-0-0) for this application, what is the approximate rate of available nitrogen application made to each square meter (N grams / m²)?</p>					
65. QUESTION WORTH 8% of EXAM	O A 5.0 pesos	O B 0.05 pesos	O C 0.12 pesos	O D 0.1222 pesos	O E None of these
<p>You are trying to determine the cost of one (1) gram of available Nitrogen (N) in a ratio 16-6-8 fertilizer. This product sells for <u>PHP 10,000 pesos</u> per metric ton. You then researched to find out that the price per metric ton of:</p>					
<p>Granular Triple Super Phosphate (0-45-0) is <u>PHP 5,500 pesos</u>.</p>					
<p>Granular Potassium Sulfate (0-0-50) is <u>PHP 6,000 pesos</u>.</p>					
<p>What is the true cost per gram of actual available Nitrogen (N) in the 16-6-8?</p>					